

Contractors and Engineers Monthly

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PICKS and SHOVELS

By O. E. POTTER

"Shrinking-Violet" Engineers

"The engineer protests that his profession does not receive the recognition to which its importance and personnel entitles it," said W. L. Abbott, past president of the Am. Soc. M. E., in a recent issue of the *Professional Engineer*.

"Engineers build railroads, and lawyers and financiers become their presidents . . . they build great bridges and some politician cuts the ribbon . . . they build a great steamship and the young lady who breaks the bottle gets the glory."

It's all too true that the engineering profession and construction industry get little or no recognition from the layman for their contributions to the progress and well-being of the world. While no one interested in the profession wants to see it cheapened by too much horn tooting, it certainly wouldn't be amiss to let the general public in on just what the engineer means in the world today. The shrinking violet role doesn't seem to suit those "he-man" construction engineers.

The Story of Tunnels

Speaking of letting the general public know what the engineers and builders are doing, a layman has recently made a definite contribution by telling, in a non-technical book intended for laymen, the story of tunnels and their place in the history of the world's progress.

This book, called "The Story of Tunnels," written by Archibald Black, special writer for the Port of New York Authority, gives us some thoroughly fascinating tales of tunnel building, the history of tunnels, the development of tunnel-building methods and a bit about the men responsible for them, and the story of the world's famous tunnels of all types, including railway, water, (Continued on page 26)

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Blading Snow From Coronado Trail in Arizona at 10,000-Foot Elevation

Drama and Routine In Snow Removal

Arizona Snow Fighting Was Front-Page News in 1937; Unsung Work in Department Routine Equally Creditable

(Photo on page 48)

ATOP the continent in Arizona, on U. S. Highway 66, where the thermometer frequently scrapes bottom with the lowest reading in the nation, the job of snow removal will be tackled again this winter by the State Highway Department with the aim of duplicating its 1936-37 record.

When a succession of unusual storms last winter piled snow more than 5 feet deep throughout much of the high-altitude district of U. S. Highways 66 and 69 and closed completely the secondary roadways, adequate advance preparations for the season reduced delay and held the expense of road maintenance to a minimum.

The routine jobs were anticipated but (Continued on page 19)

Pile Foundation For Skew Overpass Presents Problems

(Photos on page 48)

ONE of the most interesting grade separation projects under contract in Louisiana in 1937 is the overpass carrying State Route 2 over the New Orleans and North Eastern Railroad in Slidell. This route was formerly U. S. 90 until the State built the free bridges at Chef Menteur and Rigolets but La. 2 serves the vast territory to the east and north, including the so-called "Ozone Belt".

The overpass crosses the railroad at an angle of 16 degrees, but is not a true skew as the bents are all at right angles to the center line of the roadway, the variable spacing furnishing the proper clearance for the existing single track and for future double tracking. The approach fills at either end have a 36-foot crown for the roadway which widens uniformly 3 feet on either side from the 18-foot concrete highway to the 24-foot roadway on the overpass. The south approach is 528 feet and the north approach 505 feet long with 2-degree 15-minute curves on each approach extending onto the 824-foot structure, of which only 177 feet is a tangent. The low sides of the super-elevated curves on the approaches have lip curb to carry drainage back to a spillway at each end and to prevent scour on the shoulders.

Design

The overpass bents have precast concrete pile foundations carrying the footings of the arched piers. Each foundation consists of four piles with a fifth added where the bearing of the original four was not deemed sufficient. Of the twenty-two spans, seven at each end are

W. Horace Williams Co. Cast Piles on Job, Had Good Organization for Slidell, La., Contract

36-foot, 9-inch reinforced-concrete-girder spans, the two center spans are 44 feet long with I-beam stringers for the railroad tracks and the three on either side of the two center spans are 37 feet and of similar construction. The five center bents have octagonal columns and there are two pile bents at each end, consisting of 18-inch precast concrete piles. The structure has no sidewalk on either side of the 24-foot roadway, but the curbs are 10 inches high and 15 inches wide, providing protection for such pedestrians as may use the overpass.

Bent 12 is the center of the structure and at this point both spans are fixed. An expansion joint is provided at all other bents. In the south half of the structure the north ends of the spans are carried on expansion joints and similarly the south ends of the spans in the north half of the overpass are expansion joints. The expansion joints are bronze plates under the expansion end of each girder which slide on cast iron plates cast in the caps. The maximum clearance of the overpass is 22 feet over the rails at the center. Bent 12 has three columns instead of the two in the other column bents, while bents 14 and 10 have about 2-foot cantilevers. The columns are not in line from end to end of the structure and the center line of the roadway swings off the center of several of the column bents because of the reverse curves.

Test Piles and Pile Problems

The contract called for the casting and loading of a number of test piles by the contractor before the decision was made as to the length of piles to be used throughout the structure. The test piles consisted of two 60-foot piles 18 inches square, five 50-foot piles 16 inches square, three 70-foot piles 18 inches square, and one 35-foot pile 14 inches square. All of these test piles were driven and six of them were loaded.

The foundation for this structure is in sand, clay and gumbo and the tests showed a remarkable uniformity of bearing in tests of like-size piles at the same penetration, usually about 29 feet. The 16-inch piles gave an average bearing around 22 tons by the Engineering News formula. With a test load of 45 to 56 tons the settlement was only 3/32 inch and when the loads were removed the settlement was only 1/32 inch.

Central Mixing Plant

The contractor erected a central mix- (Continued on page 27)

MACHINING AN IRRIGATION DITCH



On the Rosa Irrigation Canal at Yakima, Wash., J. A. Terteling & Sons, Contractor, Is Using a Specially Constructed Trimmer to Finish Both the Bottom and Sides of the Canal. See Page 22.

Gravel-Clay Base Mixed on Mo. Road

Koss Construction Co. Built Nine Miles of Base From Steelville East; Methods Used

A CHAIN of four contracts extending some 35 miles from Steelville east to Potosi, Mo., was completed during the summer of 1937 to provide a gravel-aggregate and clay-binder stabilized base for the black-top surface contracts for which bids were received August 6, 1937, by the Missouri State Highway Department. The work was all similar in nature with the mix designed to furnish a firm foundation through the use of only such materials as could be found near the projects.

Principle of Mix

The specifications require the use of a clay binder with a recommended plastic index of 18 or better. If, however, a clay of lower grade must be used, the contractor is forced to watch the percentage of the fines in his gravel with great care. If there is a large amount of material passing a No. 40 sieve in the gravel and the plastic index of the clay which must be used is low, requiring a larger volume of clay, then the final gradation of the completed base may have too great a percentage of the material smaller than the No. 40 sieve size. This would require a scarifying of the completed base and the addition of more coarse material and complete re-mixing. Therefore, the contractor, to play safe, must secure a satisfactory clay to start with and a good quality gravel with the necessary amount of fines.

Getting Out the Gravel

The Koss Construction Co. opened gravel pits at each end of the job in creeks that offered about the correct sizes of stone. A Speeder dragline with a Speeder $\frac{3}{4}$ -yard bucket loaded the material direct from the creek beds to a bin over the belt conveyor of the Cedar Rapids crushing and screening plant, which was driven through a belt by a Caterpillar RD4 tractor. The conveyor carried the material to the 36-inch crusher set for the production of 1-inch material and the screens sent all over this size back to the crusher as the specifications required that all material in the base pass a 1-inch screen. The contractor was paid on a ton basis for all material so a Fairbanks platform scales was installed first at one end and then at the other for weighing the gravel and was later moved to the clay pits for weighing that material.

The gravel was hauled out to the road by hired trucks and dumped in an approximate windrow at one side of the traveled way at the rate of 42 tons per station. After the gravel had been windrowed the state, from its samples taken at the pits, told the contractor how much clay of the specified P. I. would be re-

quired to give the proper mix for the finished base. The rate of gravel per station depended upon the amount of clay that was necessary to add per ton of gravel. The objective was to obtain 50 tons of clay and gravel per station.

Specifications

The specifications for the surfacing aggregate, clay binder and mixture were as follows:

| AGGREGATE | |
|--------------------------------------------------------|----------------|
| Passing 1-inch screen..... | 100 per cent |
| Passing $\frac{3}{4}$ -inch screen, not less than..... | 80 per cent |
| Passing No. 4 sieve..... | 25-35 per cent |
| Passing No. 10 sieve..... | 15-35 per cent |
| Passing No. 40 sieve..... | 10-20 per cent |

After being broken down and just before it is mixed with the gravel, the clay binder shall conform to the following gradation:

| CLAY BINDER | |
|------------------------------------------|--------------|
| Passing 1-inch screen..... | 100 per cent |
| Passing No. 4 sieve, not less than..... | 85 per cent |
| Passing No. 10 sieve, not less than..... | 65 per cent |

The mixture of surfacing materials and clay binder shall conform to the following requirements and gradation:

| MIXTURE | |
|--------------------------------------------------------|----------------|
| Passing 1-inch screen, not less than..... | 95 per cent |
| Passing $\frac{3}{4}$ -inch screen, not less than..... | 85 per cent |
| Passing No. 4 sieve..... | 40-75 per cent |
| Passing No. 10 sieve..... | 30-55 per cent |
| Passing No. 40 sieve..... | 20-35 per cent |
| Passing No. 200 sieve..... | 10-20 per cent |

The fraction passing the No. 200 sieve shall not be more than two-thirds of the fraction passing the No. 40 sieve.

That portion of the mixture passing a No. 40 sieve must have a plastic index between 4 and 12.

Seeking Satisfactory Clay Binder

There was considerable trouble in trying to find a satisfactory clay for the Koss contract. After test pits had been sunk over a large number of prospective pits, five separate pits were opened before any that were within reason as



C. & E. M. Photo
Loading Clay with a Dragline at a Side-Hill Borrow Pit

far as the quality of the clay was concerned were found. The two pits that were finally chosen were $\frac{1}{4}$ mile south of the east end of the job and $2\frac{1}{2}$ miles south of a point $1\frac{1}{2}$ miles east of the west end of the job.

For handling the clay the contractor brought in four of his own Hug trucks and also hired six local trucks for the longer haul. The Hugs were used in both pits, assisted by hired trucks in the east pit where the loading was done by the Speeder dragline. At the west pit a Caterpillar Sixty with a Killefer rotary scraper was used to bring in the clay to a trap through which it was dropped onto a Burch belt conveyor which carried it to the trucks.

At the start the quality of the clay was very non-uniform, requiring a constantly changing quantity per station. From the east pit the P. I. was 25 to start with but dropped to 15 before the pit had been worked very long. It later came up and stayed around 22. Since the clay from the east pit averaged around 22 P. I. and the gravel had only 11 per cent passing a No. 40 sieve, it was necessary to add a surplus of clay, $1\frac{1}{2}$ tons per station, and then add $1\frac{1}{2}$

(Continued on page 24)

Roads in Indiana Began in Townships

Harry C. Morrison Tells of Work in Gibson County and How Township, County and State Systems Started

IN 1900 a law was passed by the Indiana Legislature permitting the Civil Townships to have surveys made of their roads upon petition of fifty freeholders. An election was held and if the petition was approved certain roads were designated for improvement financed by the bonds approved at the election. Then contracts were awarded and the work paid for by the 20-year, $4\frac{1}{2}$ per cent bonds. The Act of the Legislature limited the township bonds to 4 per cent of the value of the taxable real property of the township. As the bonds were paid off other bonds were sold to replace them, making a continuous chain of road improvement bonds.

In 1919 the County Unit Law was passed by the State Legislature, permitting 250 petitioners from at least a majority of the townships in the county to ask for an election for the construction by the county of roads running through more than one township. This law allowed the county to issue bonds up to 2 per cent of the taxable value of the entire county, exclusive of the 4 per cent limitation on the townships. Through this Act, counties were able to improve city streets as well as rural roads.

It was also in 1919 that the state highway system was started in Indiana. A portion of the township roads were

(Continued on page 11)

Dust Diseases In Construction

Possibility of Silicosis Must Have Consideration by Contractors and Preventive Measures Taken

By A. J. LANZA, M.D.,
Assistant Medical Director,
Metropolitan Life Insurance Co.,
New York, N. Y.

WITH a possible single exception, there is but one dust disease and one dust causing that disease with which the construction industry is concerned. The disease is silicosis and the dust causing it is dust containing free silica. Dusts containing silica in combined form have not been shown to cause disability or disease, with the exception of asbestos, which is a silicate.

The outstanding facts with regard to silicosis have often been detailed and will be only briefly summarized here. The dust must be in a fine state of subdivision to reach the lungs. The particles which do the damage are less than 10 microns in diameter. In this country, the amount of dust in the air at any location is determined by the standard method elaborated by the United States Bureau of Mines and the United States Public Health Service, using the impinger, the results being expressed in millions of particles per cubic foot. In order to estimate the hazard, we must know the number of particles and the percentage of silica, because a dust containing 100 per cent pure silica would be more harmful than one containing 50 per cent silica.

When we know the amount of dust, in terms of averages, the amount of silica and the extent of exposure, we are in a position to evaluate the seriousness of the hazard. We know that silicosis is a chronic disease, usually taking years to develop, and as we see it in American industries, causing little or no disability unless an infection is superimposed upon it. This infection is most often tuberculosis, to which the individual with silica-damaged lungs is very susceptible. The more severe the silica damage, the more likely tuberculosis is to develop.

We do not as yet have permissible or safe standards of dustiness. There is such an extremely wide variation of industrial processes and environmental factors that any elaborate system of standards would be impracticable; but a simple workable standard is highly desirable. There is a rough standard,

(Continued on page 33)

Blasting Involves Another Hazard; Poisonous Gases in Air Increase Danger from Dust Particles

By DANIEL HARRINGTON, Chief,
Health and Safety Branch, U. S. Bureau
of Mines

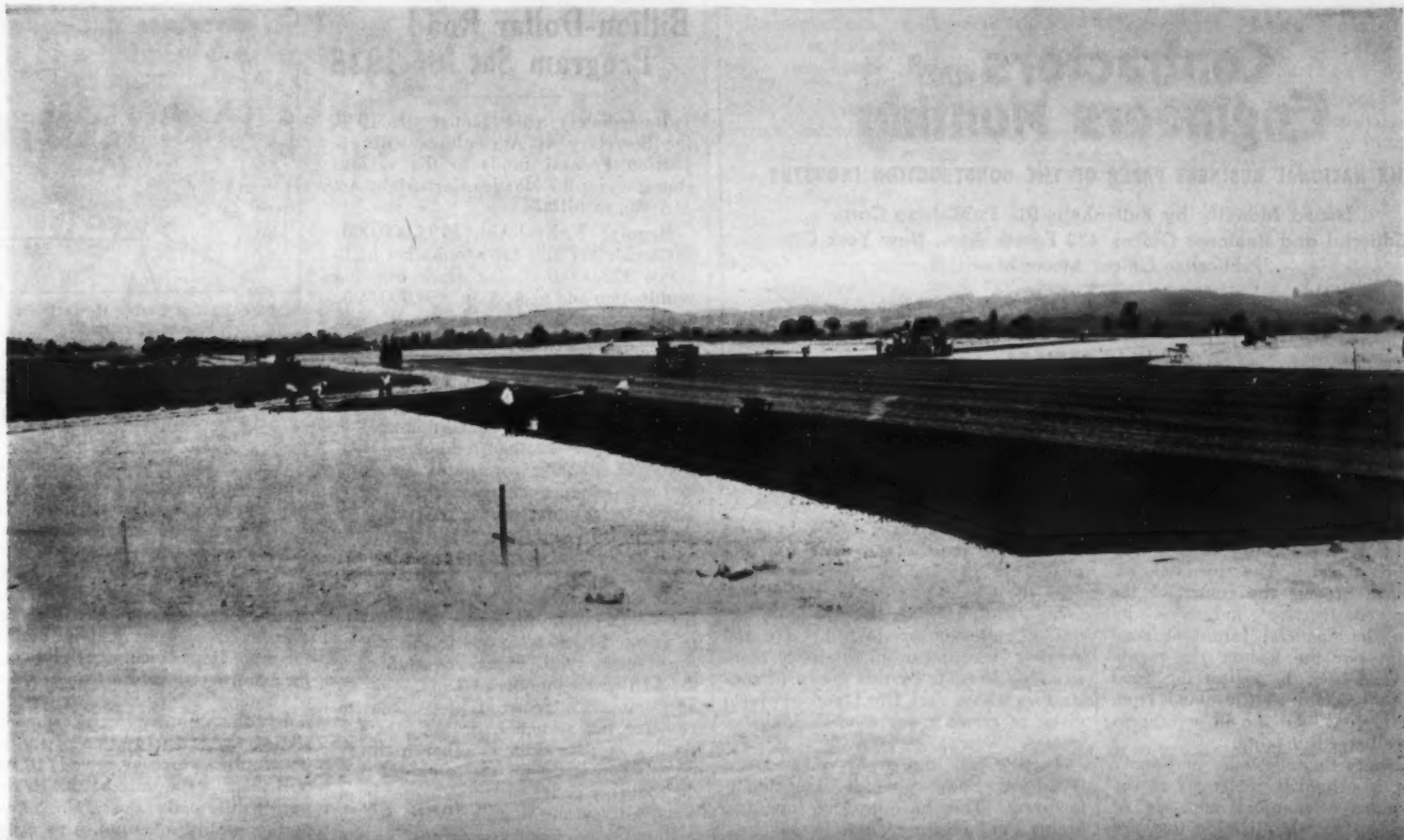
NEXT to dry drilling, blasting causes more finely divided dust to be thrown into working places than anything else; and in addition to throwing violently into the surrounding air immense quantities of finely divided dust, blasting with the heavy charges of explosive required in quarrying and tunneling operations also impregnates the surrounding air as well as the muck piles with considerable quantities of poisonous gases, such as carbon monoxide, oxides of nitrogen and, in some kinds of rock, hydrogen sulphide and other dangerous sulphurous fumes, practically all of which occur in such quantities and percentages under some circumstances as to asphyxiate persons who may breathe them or to cause serious illness, often of a more or less permanent character.

Many persons who have studied the incidence of dust disease are of the opinion that the breathing of even small quantities or percentages of extraneous or harmful gases, such as carbon monoxide, oxides of nitrogen, hydrogen sulphide, etc., inflames or otherwise adversely affects the respiratory organs,

(Continued on page 32)



C. & E. M. Photo
Agricultural Equipment Aids Contractor in Breaking Clods and Mixing Gravel and Clay for Base in Missouri Road



READING, PA., AIRPORT

TEXACO — paved

General view of runway surfacing operations at Reading, Pa., Airport. A plant-mix of Texaco emulsified asphalt and slag is being laid on the three runways of this port.

Airport runway construction has opened another important and profitable field for the paving contractor.

The contractor does not start from scratch in this field, however. All the experience and knowledge he has gained in street and highway construction will help him build good, durable runways.

During the past 33 years, contractors have paved thousands of miles of America's roads and streets with TEXACO Asphalt. Naturally, therefore, they are today using TEXACO Asphalt in airport runway projects all over the country, whether they require Asphalt Cement, Cutback or Emulsified Asphalt.



ASPHALT

THE TEXAS COMPANY, Asphalt Sales Department, 135 East 42nd Street, New York City

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The A.R.B.A. Road Show as an Investment

No matter what the point of view, the A.R.B.A. Road Show is a worthwhile investment. The biennial exhibits have become the center of the highway construction industry's interest in the financial future of road building. For the visitor, the manufacturer and even the Editor the great exhibit to be held in Cleveland from January 17 to 21 will be an investment that is well worth making.

The County Commissioner or County Engineer is primarily interested in the newer, more economical methods of base and surface stabilization that are going to extend the county roads in dustless and more lasting miles throughout the county. At the Road Show they will find the latest in methods and equipment, such as distributors, and power patrol graders that will serve the county through summer and winter in keeping the roads in the best of condition.

The State Highway Engineers and other highway officials will be investing their time and thought on the newer machines that will produce the road-mix surfaces for the primary highways in the southwestern states where the road dollar is scarcer than in the more industrial sections, and for the secondary highways of the wealthier states. The various methods of base stabilization will come in for discussion, both during the meetings and around the luncheon and dinner tables. The money spent by these two groups in meeting each other and examining and discussing machines and methods will result in savings of taxpayers' money by securing the best type of construction, stabilized, bituminous or concrete, that is needed for the traffic that will use the improved road during its life. And don't forget the investment in maintenance that increases the life of the original investment many-fold.

Next come the men, tried and true, who stake their own skill and brains and money in building the roads, designed by engineers, under the specifications and inspection of engineers,—the contractors. They are investing their time and money in visiting the Convention and Road Show that they will be able to purchase the best of the

machines exhibited in order to meet every new requirement that has appeared in the specifications and produce the best road foundation and surface possible with the methods required. Remember that by far the greatest investment in highway construction is made by this group of contractors whose very life blood has been given in creating our modern highway system.

Then comes the group that makes the Road Show possible, the manufacturers. They have invested time and brains in creating new excavating equipment that will cut the pennies from the cost of moving a yard of dirt or rock; new pavers that will make the concrete road reach a longer distance in one day of ten hours; machines to mix a larger yardage of plant or road-mix material for surfacing the base stabilized by a new machine produced by another manufacturer. Millions of dollars in manufacturing tools, in materials already purchased for the 1938 equipment yet to be produced, and in experimenting with the best designs, will be represented in the greatest road-machinery exhibit ever staged in any country, right in the industrial center of America not more than two days from the farthest part of the country. Don't miss it.

We who travel most of the year to see the equipment, methods and organization used by contractors and state and county highway departments feel that the assembling of the best of equipment at Cleveland presents the greatest opportunity for us, as well as for all highway construction men, to get the most information about the largest variety of construction equipment in the shortest possible time by spending the week of January 17 at the Road Show. We do not suggest that you spend the entire week imbibing the generously proffered refreshments of a hearty host in a hotel room. We urge you to examine every machine carefully and measure its productive capacity in your particular field of activity. Invest your time and money in the Cleveland Road Show and you will reap dividends in better results and improved profits on rational bids throughout 1938.

and discussions on the program of the A. R. B. A. Convention covers quite thoroughly the problems of state, county, township and municipal road construction, maintenance and administration and the volume serves as a valuable reference book on highway problems.

Copies of this 827-page book may be secured from the American Road Builders' Association, National Press Bldg., Washington, D.C. Price: \$10.00. These annual volumes of papers presented before the conventions of the American Road Builders' Association are given free to all members.

Proceedings of 1937 A. R. B. A. Convention

In his foreword for the *Proceedings* of the Thirty-Fourth Annual Convention of the American Road Builders' Association in New Orleans in January, 1937, Charles M. Upham, Engineer-Director of the Association, relates that a layman once said to him, "I have thoroughly read your Annual Convention *Proceedings* and, in so doing, I have gained for myself a liberal highway education."

The complete report of the papers

Billion-Dollar Road Program Set for 1938

Immediately after January 1, 1938, the Secretary of Agriculture will apportion Federal funds to the various states, under the Hayden-Cartwright Act of 1936, as follows:

Regular Federal-Aid, \$125,000,000; for secondary and farm-to-market highways, \$25,000,000; for grade crossing elimination and protection, \$50,000,000; for the construction, improvement and maintenance of roads and trails in national parks, \$7,500,000; for forest highways, roads and trails, \$14,000,000; for main roads through unappropriated or unreserved public lands, non-taxable Indian lands or other federal reservations, \$2,500,000; for the construction and maintenance of parkways to give access to national parks, \$10,000,000; and for the construction and improvement of Indian Reservation roads, \$4,000,000; making a total of \$238,000,000.

According to the U. S. Bureau of Public Roads, state highway departments received \$1,145,590,000 for highway purposes in 1936. Figures available for the first seven months of 1937 show an approximate increase of 14 per cent in gasoline tax revenues, or \$90,000,000. With a relative gain in other highway revenues, it is reasonable to expect that the highway program for 1937 has been materially greater than in 1936.

Present indications, according to the American Road Builders' Association, are that other highway revenues will at least maintain the 1937 level, in which event the 1938 highway program will exceed a billion dollars by several hundred million.

U. S. B. P. R. Reports Work Completed Last Year

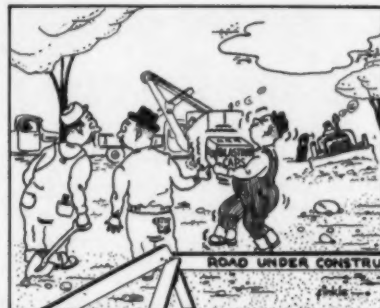
More than 22,000 miles of highways of all classes were completed under the supervision of the U. S. Bureau of Public Roads in the fiscal year ending June 30, 1937. By far the greater portion of this work was done in cooperation with the state highway departments and under detailed state supervision. In this class were 11,401 miles of road financed in large part with special emergency funds and 7,367 miles of regular Federal-Aid work.

Notable progress was made in the Federal program of the elimination of hazards at grade crossings in which 1,149 crossings were eliminated, 574 were protected with signals or other devices, and 196 grade separation structures were reconstructed.

Payments of Federal funds to the states on account of the above work totaled \$337,747,071. At the close of the fiscal year the emergency funds were very largely expended and future work will be supported by annual authorizations for each of the fiscal years 1938 and 1939 of \$125,000,000 of Federal-Aid for improvement of the Federal-Aid system, \$25,000,000 for secondary roads and \$50,000,000 for elimination of hazards at grade crossings.

Other work completed under Bureau supervision included 139 miles of highway in national forests, 169 miles in national parks, 245 miles in public lands, and 33 miles of replacement of flood-damaged roads. Nearly 3,400 miles of road built with funds provided by other Federal agencies and turned over to the Bureau for supervision of construction were completed.

Highway planning surveys are being carried on by 44 state highway departments in cooperation with the Federal government. Field work in collecting data on road mileage and conditions, on the volume of traffic on highways



"I'd Feel a Lot Better If He Didn't Have the Hiccups!"

Safe Drinking Water On Future Pa. Jobs

As a result of a typhoid epidemic which originated on a Pennsylvania state highway contract last year, the Pennsylvania Department of Highways has taken steps to insure the safety of drinking-water supplies on all contracts in the future. As each contract is awarded the Sanitary Engineering Bureau of the State Health Department will be notified by the State Department of Highways. Then the contractor, before using any source of water for drinking purposes, must notify the Sanitary Engineering Bureau, stating the exact location of the supply or supplies which he intends to use. It will then be the duty of the Health Department to make a careful examination of the supply or supplies to determine whether the water is safe from the sanitary standpoint.

Of prime importance is the fact that the contractor is not to be permitted even to start work until he has received his notification from the Health Department that the water supply he plans to use has been approved for drinking purposes.

and on highway finance has been completed in most states. This mass of data is now being tabulated and when this work is completed, there will be available a complete picture of the highway situation.

Investigation of road materials and methods of construction have been continued by the Bureau of Public Roads. Important facts have been learned concerning the required dimensions and reinforcement of concrete roads, the design for bridge floors, and the properties of bituminous materials. A special problem of working out a method of designing flexible-type road surfaces such as gravel, macadam and bituminous mixtures, applying principles of mechanics and mathematics, is now being studied by the Bureau's research engineers. Such a method is needed to design surfaces properly for different loads, taking into account differences in materials and in soils on which road surfaces are placed. Special apparatus is being devised for use in these studies.

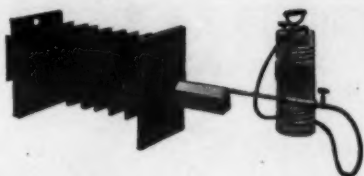
Highway User Taxes

This is the title of a 54-page booklet on the results of a study of the various types of taxes borne by motor vehicle users recently essayed by the staff of the National Highway Users Conference. The determination of the extent and volume of these taxes presented an exceedingly difficult and complicated task, as the 28,000,000 motor vehicles and their owners are scattered throughout more than 100,000 taxing jurisdictions.

Compiled in graph and tabular form, a great deal of information on all the various kinds of taxes paid by motor vehicle users is contained in this booklet, copies of which may be secured from the National Highway Users Conference, National Press Bldg., Washington, D.C. Price: 25 cents.

Accordion Salamanders, Sweet Music in Winter

The tremendous increase in heating surface and the production of heat by an oil burner makes the new type of oil-fired Littleford salamander truly sweet music to the contractor who has winter construction jobs that must be heated. This new salamander has 2,000 square inches of heating surface, giving much greater radiation from the 2,100-degree flame temperature.



The New Littleford Accordion Salamander

One of these units equals several coke-burning salamanders in volume of heat produced for effective prevention of freezing of concrete during setting.

One man can easily move the accordion salamander which drops no ashes nor sparks and gives out no smoke. A 4-gallon tank of kerosene burns 12 hours in the torch. The accordion salamander is 38 inches long, 14 inches wide, 24 inches high and the shipping weight of this new heater is only 85 pounds.

Bulletin M-11 describing all Littleford winter heating equipment may be secured by any interested readers from Littleford Brothers, 485 E. Pearl St., Cincinnati, Ohio.

Denmark Plans New System of Highways

Denmark is to copy Germany's system of Autostrasse highway construction, according to recent reports from the U. S. Bureau of Foreign and Domestic Commerce. At present eighteen major highways are numbered and are to be reconditioned and the Danish Autostrassen will eventually include 1,242 miles. No. 1 of the system from Copenhagen to Korsor is to be about 92 feet wide, including 9-foot foot paths.

I'll see that NORTHWEST

at the ROAD SHOW!



—And that's not all you'll see! Here is the only real opportunity to see all the leading equipment for solving your job problems. Here you can climb over shovels, pavers, mixers, spreaders, rollers, tractors—every type of construction equipment—to your heart's content. See how it's built! See how it works—make comparisons—check operation data—see other equipment owners. Meet us at the Road Show.

Come to Cleveland Jan. 17-21
A. R. B. A. Road Show and Convention

Features of Work For New Strip Mill

Fleet of 46 Trucks and 6 Excavators Moved Dirt; 10 Truck-Mixers Poured Concrete on Ala. Job

(Photo on page 48)

MORE than 1,000,000 cubic yards of dirt and rock were moved in a big excavation job recently at the site of the new \$30,000,000 strip and tin plate mill in Birmingham, Ala., erected by U. S. Steel's subsidiary, the Tennessee Coal, Iron & Railroad Co.

The tin plate mill is being set down in a nest of other big steel operations in a district said to be the only one in the world to possess all the elements for fluxing steel, including iron ore, coal and limestone. Before the plate mill could be erected, however, the excavation had to be done and the contract for this work was awarded to the Hooper Construction Co. of Bunnell, Fla.

Excavation

The original contract called for the excavation of a total of 770,000 cubic yards of rock and dirt, of which about 100,000 cubic yards was rock, in 100 working days. The contractor got along so well with this contract that he was able to take on considerable excavation in connection with the laying of the foundation. All in all, more than 1,000,000 yards of dirt and rock were moved.

With the time limit on the job, two shifts were employed, with floodlights used for the night operations. The time between shifts was devoted to servicing the heavy equipment, such as cranes, steam shovels, tractors and scrapers.

The equipment in the job included forty-six International dump trucks, one Lorain and one Northwest dragline, one Northwest crane with clamshell bucket, three Lorain 1 1/4-yard shovels, two motor patrols to keep the truckways graded, three Bullgraders mounted on Caterpillar Thirty-Fives and one Caterpillar tractor and blade. In addition, a Cleveland drill and air compressor, a Gardner-Denver compressor with jackhammer and various explosive equipment was used.

Operating Schedule

The schedule of operations was so well worked out that the truck drivers were able to average a round trip of 1 1/2 miles and dump 2 yards of dirt every 7 minutes. This speed of operation required rigid supervision. Each driver was assigned by number to a certain truck and to a certain shovel. No driver was supposed to wait over 2 minutes for a shovel. The field office, located midway of operations, checked each load as the truck went by. In addition, a check was made on each driver every 30 minutes, provided his truck went out of service for any reason.

More dirt was moved at night as operations were nearer the dump heap. An average of 3,000 truck loads was moved by the night shift. Lights were arranged on A-frames at the ends of the line so that they could be moved ahead as needed.

Each truck was pulled off the run every 60 to 70 hours for change of oil, lubrication and checking. Two service men checked the generator, starter, water pump, battery, lights, etc. Generally this check-up kept the truck out of service only 15 minutes. Drivers stopped at a gas pump along the way and filled up with gasoline whenever the fuel tank was low.

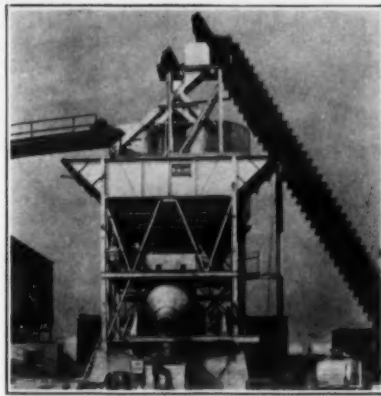
The maintenance men were able to take care of a breakdown in record time,

this speed being due partly to the fact that the trucks were all of one make and one model. A complete transmission system was kept assembled, and a set of springs built up and ready for installation on a minute's notice.

Records of gasoline consumption were kept, both as measured out to the trucks and night and day meter readings. As the trucks idled considerably, the matter of gasoline mileage was not considered, the cost per yard of dirt moved being the dominating factor throughout the job.

Safety

Safety precautions included constant sprinkling of the ground to keep down dust and improve visibility. The 1,000-watt lights on the field were a safety



This Complete Blaw-Knox Central Mixing Plant, Owned by the Birmingham Slag Co., Handled Some 100,000 Yards of Concrete Used in the Construction of the Strip Mill. Ten Blaw-Knox Truck-mixers Delivered the Concrete, Handling 60 Yards an Hour on Some Pours

factor at night. Careful routing of the trucks to and from the shovels as well as frequent check-ups of equipment were

also contributing factors to the safety record. Not a man was hurt during the operations.

Concreting

Some 120,000 cubic yards of concrete was required for the foundations of the mill. The concrete was supplied by the Birmingham Slag Co. from a Blaw-Knox central mixing plant set up at a Tennessee Coal, Iron & Railroad Co. slag pit located 2 miles away from the job. The concrete was delivered by a fleet of 10 Blaw-Knox and two Rex 2-yard truck mixers. As much as 60 yards of concrete an hour was handled on some pours.

Accessibility of the work to the trucks made a concrete distributing center unnecessary and for the most part trestles were built up over the foundations so that the mixer trucks could drive up and discharge directly into the foundation. In some cases it was necessary to use 2-yard Insley drop-bottom buckets which were maneuvered either by dragline or overhead crane. In a few cases chutes

(Continued on next page)

"Oh Boy!"

NO BACK-BREAKING HAND LEVERS on the

LINK-BELT

● Today, operators all over the country are shouting the praises of the Link-Belt Speed-o-Matic. The easy, hydraulic-pressure lever controls have made operation like play instead of work. The "feel" of the clutches is so natural—just like the machine is alive. Its movements are faster—it stops quicker—its power

seems greater—more sensitive—it's a "honey" to handle. And—the biggest news of all—a Speed-o-Matic pays for itself by greater yardage moved—more pay dirt per hour—because its operator is never tired—as fresh at the end of the day as if he had just come back from lunch. Send for Book No. 1795.

LINK-BELT COMPANY

300 W. Pershing Road, Chicago
Distributors and Offices in Principal Cities

7240





A Line of Internationals at One of the Shovels. No Truck Had to Wait More Than Two Minutes

2,500 people in the manufacture of tin plate.

Personnel

On the excavation for this project, P. B. Harrell was Office Superintendent for the contractor, Hooper Construction Co., of Bunnell, Fla., and C. J. Germack was in charge of maintenance.

Road Work in Borneo

Plans for a 310-mile highway from Bandjermasin on the southern coast of Borneo to Samarinda on the east coast, opening up the territory in the southeastern section of the country, are now under discussion by the authorities in South and East Borneo. About 124 miles of this highway has been completed but work on the remainder has been held up because of lack of adequate labor.

It is estimated that the cost of completing the highway will be approximately from \$2,200,000 to \$2,750,000, part of which will be paid by the autonomous province of Koetei.

out rock fissures and slits.

Some 25,000 tons of structural steel is being used for the 22 acres of under-roof plants in this mill. When complete, the plant will employ approximately

(Continued from previous page)
were rigged up in order to reach remote corners.

The foundations were excavated 30 to 40 feet in some places in order to clear

Highway Engineer Looks at Safety

Ways and Means by Which State Highway Departments Can Promote and Increase Safety on the Highway

By J. T. HALLETT,

Former Assistant Chief Engineer, Now Traffic Engineer, Indiana State Highway Commission

IN MAKING an inventory of the various things which the State Highway Commission of Indiana is doing to promote and increase safety, I was surprised at their number and magnitude. Because of lack of sufficient information on the general subject of safety, it is quite possible that some of the things we are doing now in the interest of safety may later prove to have the opposite effect. This is a reaction for which we must always be on the lookout.

To illustrate, let us take a railroad grade crossing which has a certain hazard factor. To eliminate this hazard, a separation structure is constructed. Creating a shorter sight distance over the structure due to vertical alignment may produce a greater hazard factor than the one eliminated by separating the railroad grade from the highway. If there is an important road intersection which requires stopping traffic on one road or the other within or near the approach grades to a railroad grade separation, possibly that would produce a greater hazard factor than the factor removed by the separation of the grades. It is questionable if some things done or being done for increasing safety really accomplish the purpose.

Things We Are Doing

Nevertheless, here are some of the things which we are doing in an attempt to increase safety and, if they do not do so, we can only say we made a mistake and try again, benefited by the knowledge gained from previous trials. We are easing and banking turns and curves; lengthening vertical curves to increase sight distance; widening shoulders and roadways and surfacing shoulders; widening bridges, culverts and pavements at railroad crossings; securing wider rights-of-way and cutting back at intersections and in some instances redesigning intersections to improve sight distance and traffic movements; cutting down steep grades so that traffic can move more freely and to increase sight distance; and building sidewalks on bridges and occasionally along the highways.

When laying new pavement, we use late belting and broom the concrete to produce granular non-skid surfaces. Great care is used in securing the proper bitumen content in bituminous pavements to produce a gritty non-skid texture in the surface and we are careful to remove the bituminous filler from the surface of brick pavements to prevent a slippery surface. We are building in traffic lines to divide traffic lanes. We are constructing railroad grade and highway grade separation structures and divided-lane highways. We are erecting guard rail funnels at narrow bridges and placing guard rail at hazardous places along the highways.

In the department of maintenance, we give constant care to the surface of pavements to maintain even smooth-riding surfaces; we paint center lines and traffic stripes, including the yellow center line over hills and places of short sight distances; and we mow the weeds along the highways to increase visibility. Snow and ice are removed from the highways to promote both convenience and safety; sand and cinders and some

(Continued on page 36)

What a Machine!"

Speed-o-Matic SHOVEL DRAGLINE - CRANE

Now
LESS EFFORT
TOP SPEED



It is a known fact that the operator's physical capacity limits the yardage handled per day, not the mechanical capacity of the machine. Time studies prove that the Speed-o-Matic enables the operator to get 25% or more yardage than from the same machine with manual-lever control.



Modern Detonating Fuse

Primacord-Bickford detonating fuse, consisting of an explosive core contained in a waterproof textile covering, which can not be set off by friction, fire or any ordinary shock but must be detonated by a blasting cap attached to it, is described in a new 18-page booklet recently issued by The Ensign-Bickford Co., Simsbury, Conn.

The explosive wave of Primacord-Bickford detonating fuse travels approximately 20,350 feet a second, al-

most 20 per cent faster than the Cordeau fuse made by this company and which has been in use in quarrying and on construction jobs for years. This is practically instantaneous, yet the fraction of time delay allows relief of burden, so that a minimum quantity of explosives obtains the maximum of results, according to the manufacturer.

Complete details on this new blasting fuse and general instructions for its use in various types of blasting are contained in the booklet "Primacord-Bickford Detonating Fuse."

Stabilization by Drainage

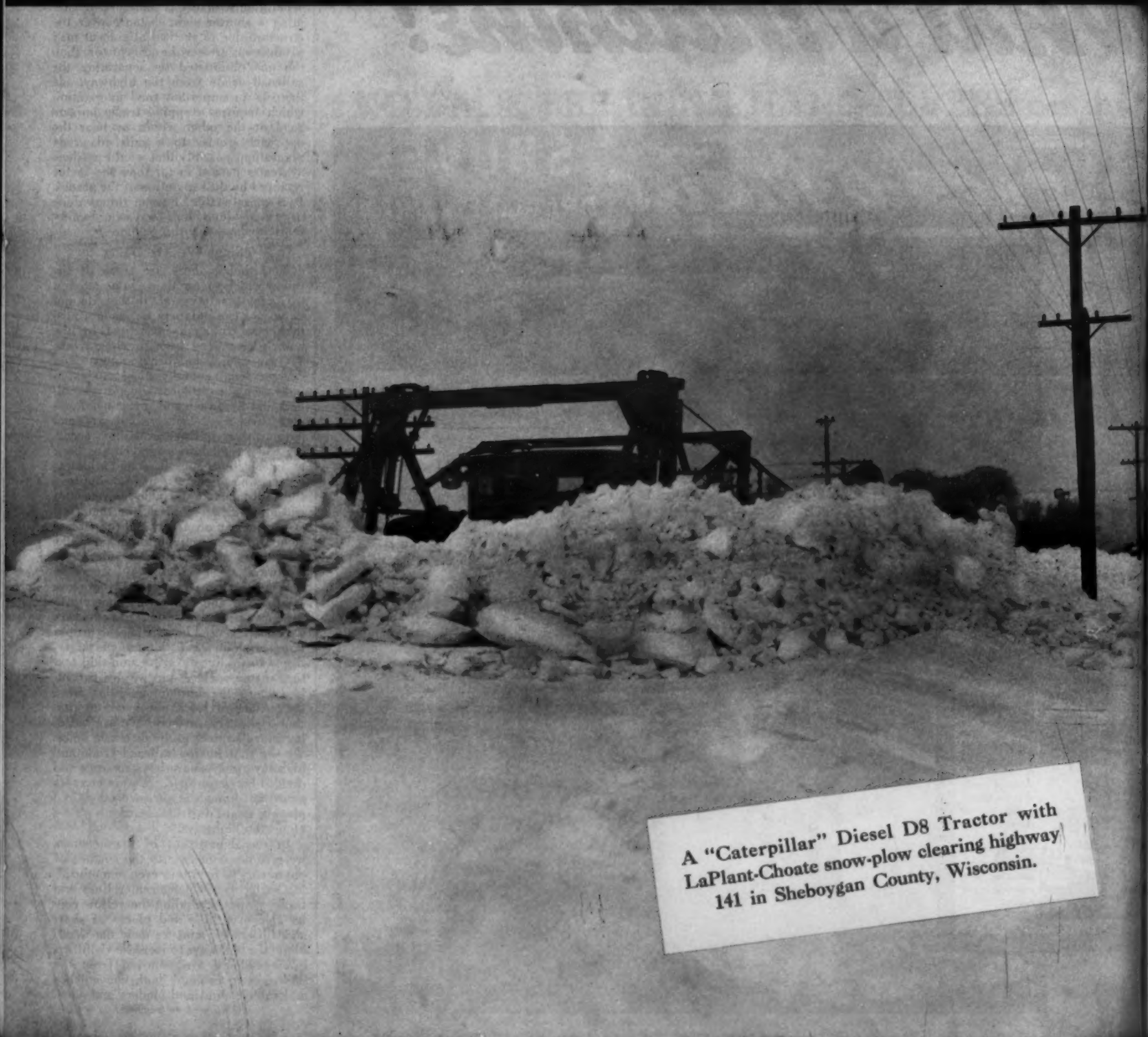
A discussion of roadbed stabilization by drainage prepared by H. E. Cotton, Drainage Engineer for Armco Culvert Manufacturers Association, for the American Road Builders' Association Convention in New Orleans last January and later published in *The Highway Magazine* is now available in reprint form.

The article, which is prefaced by a discussion on subgrades vs. pavement failures by H. H. Houk, Chief Engineer

of the Alabama State Highway Department, discusses in detail highway subdrains, the use of the soil auger, the location and depth of subdrains, cut slopes, the installation of pipe, and presents tables showing the depth of flow and discharges required to move various solids.

Copies of these reprints "Roadbed Stabilization by Drainage" may be secured from Armco Culvert Manufacturers Association, Middletown, Ohio, without obligation, by mentioning this magazine.

WINTER and SPRING MAN



A "Caterpillar" Diesel D8 Tractor with LaPlant-Choate snow-plow clearing highway 141 in Sheboygan County, Wisconsin.

Soil Stability Testing Equipment

A convenient piece of test equipment for determining the stability of soils or soils mixtures has been developed by the Black & Decker Mfg. Co., Towson, Md. This Soil Stability Test Loadometer is 55 inches high, 22 x 18 inches in plan, and weighs 700 pounds.

In order to determine the amount of stabilizing material to be used with local soils, sample cores are prepared using

various arbitrary percentages of stabilizers, such as oil, asphalt or emulsified asphalt. The sample cores can be compacted to required density with the Soil Stability Test Loadometer. After the cores are prepared, they are ready for the absorption test and the stability test. The stability test is accomplished with the Test Loadometer by the extrusion method. The results indicate the proper percentage of stabilizer necessary to produce a surface which retains its stability against displacement under tractional forces, and sufficient flexural strength

to give good load distribution to the sub-grade yet sufficiently flexible to yield slightly under passing loads without breaking up.

This Test Loadometer has an 8½-inch gage hand-calibrated at 100-pound intervals from 0 to 50,000 pounds. The gage is equipped with a maximum indicating hand. Pressure is applied to the hydraulic cell and to the plunger of the extrusion apparatus by a heavy-duty journal jack whose gears are mounted on ball-bearings. The ratchet shaft is equipped with an auxiliary spider wheel

which makes it possible to apply low pressure by hand from 0 to 10,000 pounds at a very uniform rate of speed. From 10,000 to 50,000 pounds pressure, the load is applied by means of a bar fitting into the ratchet shaft.

Full information including a picture of the machine may be secured direct from the manufacturer by readers mentioning this magazine.

**A. R. B. A. ROAD SHOW
CLEVELAND, JAN. 17-21.**

MANEUVERS

JUST as the U. S. Fleet guards the lives and property of us all, so fleets of "Caterpillar" Diesel Auto Patrols guard the lives and property of the community. Here is peace-time protection, Winter and Summer. Eternal vigilance is the price of clear, clean, well-kept roads and streets. Emergency vehicles must get through at all times; commerce and travel must go on as usual. Throughout the world, there are thousands of fleet-owners of "Caterpillar" products, ready to confirm the foregoing.



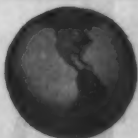
At Morning Side, Sioux City, Ia., this "Caterpillar" Diesel D4 Tractor with a No. 22 Grader maintains city streets on a fuel-cost of less than 50c a day.

P. L. Minor, Supt. of Highways, purchased these two Diesel No. 10 Auto Patrols for Greenwich, Conn. Each machine uses less than 50c worth of fuel per 8-hr. day.



CATERPILLAR TRACTOR CO.

PEORIA, ILL.



WORLD'S LARGEST MANUFACTURER OF DIESEL ENGINES, TRACK-TYPE TRACTORS AND ROAD MACHINERY

A New Motor Grader With Built-Up Power

A motor grader with a built-up power unit in place of the customary industrial tractor power plant has been announced by Austin-Western Road Machinery Co., Aurora, Ill., in its new 66 motor grader. This unit is built with a choice of four front axles. A narrow front axle is standard on the 66 but three other types are available, namely, a wide axle with straight wheels, a wide axle with leaning wheels, and a shiftable axle.

Furnished with an electric starting Buda-Lanova diesel motor or an International Harvester gasoline engine, this grader can be started from the cab, just like an automobile. A wide range of speeds provide power for heavy work and speed for light maintenance or in-between-job transportation.

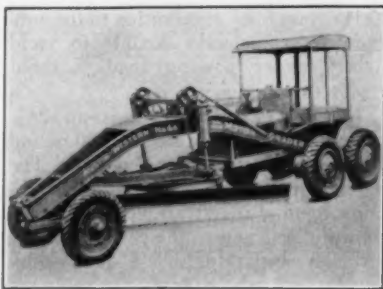
Hydraulic controls operate every function of the grader. The weight of the machine and engine are distributed to place the maximum pressure on the blade, eliminating the tendency to jar and bounce. The rear end has sufficient weight for positive traction and pressure on the front wheels is great enough to resist side thrust. The Austin-Western anti-chatter device, exclusive on A-W graders, permits a smooth even cut. Two powerful springs hold the circle solidly against the draft beams, preventing chatter but permitting the circle to reverse freely. The blade circle is 60 inches in diameter, insuring adequate support for both ends of the 12-foot blade at all times.

The 66 motor grader is described in Bulletin AD 1687 which may be secured direct from Austin-Western Road Machinery Co., on request.

V-Type Snow Plows For Light Trucks

When a state highway engineer or a county commissioner is contemplating the purchase of a snow plow, one of the first considerations is whether it lifts and throws the snow or merely pushes it ahead. Arps Corp., New Holstein, Wis., has developed in the Blackhawk V-type truck plow a unit for 1½ to 2-ton trucks which is mounted on a sub-frame with a hydraulic lift.

V-type and straight-blade plows are



The New A-W Model 66 Grader Powered by a Buda Diesel Engine

interchangeable on the same sub-frame, the shift being made in about 30 minutes. These plows are all electrically welded with moldboards of 11-gage steel, reinforced with braces at the pressure points. The cutting blades are reversible and the skid shoes are of fine high-carbon steel to insure long wear. The hydraulic lift is operated from the cab.

The V-type plow has a cutting width

of 84 inches, is 32 inches high in front and 39 inches high in the rear and weighs 1,105 pounds. A side wing with brackets for removing the top of the snow bank thrown up by the V-plow is also included in this line of hydraulic-lift plows.

Phila. Distributor Moves

The Bowen Machinery Co., of Philadelphia, Pa., has announced its removal to new offices located at 112 South 16th Street.

AMERICAN DE LUXE CONCRETE WHEELBARROWS

At last—Load actually over the wheel



QUALITY
IS
ECONOMY

The first modern development in Barrow construction.

Also—Scrapers, Grading Plows, Concrete Carts, etc.

THE AMERICAN STEEL SCRAPER CO., Sidney, O.

¾-YD. LORAIN-40

Revolutionizes

AN OLD COUNTY CUSTOM

It was the limited size of the pocketbook rather than that of the job which, in the past, prompted most counties to use shovels and cranes of only ⅓ or ½-yd. capacity. But the ¾-yd. Lorain-40 put an end to this old county custom. Today these users are enjoying the economies of big machine production at small machine cost.

The Lorain-40, while offering full ¾-yd. capacity, weighs no more than most ½-yd. machines and is priced well within the average county's budget. And although delivering from 50 to 100% more capacity, the Lorain-40 costs no more to operate and maintain than a ½ or ⅓-yd. unit.

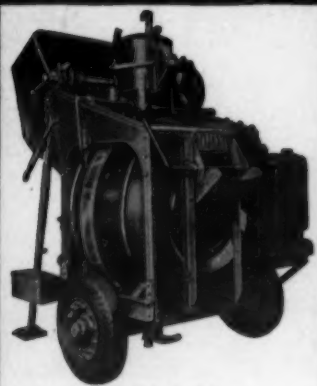
The ¾-yd. Lorain-40 is a logical county choice where maximum production is desired at minimum cost. However, the Lorain line includes shovels and cranes of ⅓, ½ and ⅝-yd. capacity, all of which are outstanding values in their class. Write today, outlining your needs, and a catalog describing the Lorain best suited to your requirements will be sent you promptly.

UNIVERSAL CRANE DIVISION
THE THEW SHOVEL COMPANY
LORAIN, OHIO



LORAINS

BUYING A MIXER?



DEMAND:

- Faster Charging and Discharge Speeds,
- Machined Steel Tracks,
- 2 Wheel Mounting with Timkens and Pneumatics,
- End Discharge Advantages,
- Men-Ten Alloy Steel,

Send for New Catalog, Prices 3½S to 56S Sizes.

THE JAEGER MACHINE CO.
701 Dublin Ave., Columbus, Ohio

JAEGER

Township Roads Started Highways in Indiana

(Continued from page 2)

taken over by the state and designated as the state highway system. This brings up an interesting light on highway construction in Indiana, and it goes back to an earlier mode of transportation, as cited by Harry C. Morrison, County Surveyor, Gibson County, Princeton, Ind. In the early 1800's there was great enthusiasm for the proposed Wabash and Erie Canal which would provide a dependable means of communication and transportation across the State of Indiana. Work was started and bonds issued by the state for the work, but the \$10,000,000 of bonds were expended before the work had reached anywhere near completion. This disgusted the people so that when the constitutional convention of the state was called in 1852 it was voted as a part of the new constitution, and it still remains there, that the State of Indiana was forever forbidden to issue any bonds. There have, therefore, never been any state highway bonds issued in Indiana.

In line with this state policy a moratorium was voted by the State Legislature in 1932 on County and Township Road Bonds and in 1937 this was made permanent, so that the policy of no road bonds, and the institution of the pay-as-you-go policy is now extended from top to bottom as far as highway bonding goes. The later bonds of the counties and townships were mostly for 10-year terms so that by 1940 there will be no more bond payments required in any of these governmental units of the State of Indiana.

Highway Work in Gibson County

The design of highways and bridges for Gibson County is in the hands of the County Surveyor, Harry C. Morrison, while the actual construction is the responsibility of the County Supervisor of Highways, Earl Smith. Gibson County has 493 square miles and there are 1,053 miles of highways under county supervision, that is, the responsibility of the County Commissioners. Of these about 600 miles are water-bound macadam and gravel and the balance are dirt roads.

There are ten Civil Townships in Gibson County, and up to about 8 years ago the townships handled the maintenance of their own dirt roads while the county maintained the improved roads. Since that time, however, the county has maintained both the surfaced and the earth roads.

The financing of work in Gibson County is from the state gas tax which is apportioned to the counties. Last year and this year the amount received by Gibson County was \$156,000, but for 1938 it will receive only \$130,000 as a reapportionment reduced the sums received by some counties, increased others and allotted more to the cities.

Among the work done in Gibson County of which the highway department is particularly proud are eight blocks of surfacing within the city limits of Princeton, the county seat. This project completed 12 years ago was

one of the city jobs done by the county under the petition method. Four blocks of North Main Street from the court house square had failed so the old brick pavement was resurfaced with Kyrock, a Kentucky rock asphalt, and there has been no money spent for repair or maintenance since that time except where there have been utility cuts through the entire pavement. An additional four blocks north of these was resurfaced over an old stone base which also ran under the brick pavement mentioned before.

The county now has under construction two 70-foot steel bridges as WPA projects. The county provides a competent foreman who directs the work of erection by WPA labor. The county uses corrugated metal culvert pipe for all drainage structures up to 24 inches and reinforced concrete for all larger drainage structures and for bridges.

Equipment

The equipment owned by Gibson

County for the maintenance of the county highway system consists of two Caterpillar Forty and one Caterpillar Fifty gas tractors; one Adams, Austin-Western and Galion 10-foot grader, and two power patrol graders, one Adams and one Galion. The hauling equipment consists of twelve 1½-ton Chevrolet, Ford and International trucks with Wood dump bodies and hydraulic hoists.

Open-Web Steel Joists

The increasing use of open-web steel joists in building construction and in structures more closely associated with the heavy construction industry has led the Bethlehem Steel Co., Bethlehem, Pa., to issue a new catalog on its open-web steel joists. This catalog contains specifications for this type of construction, dimensions and properties tables, steel joist design tables and illustrations and descriptions of accessories for this type of construction.

Streamlined Tractors

A new 26-page booklet on Cletrac AG streamlined tractors has recently been issued by the Cleveland Tractor Co., Cleveland, Ohio. The various features of these tractors, which burn gasoline or tractor fuel, are described in detail and illustrated and a large cross sectional view of the tractor, showing all its parts, is included.

GRIFFIN WELLPOINT SYSTEMS 33 1/3% more efficient

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LEADERSHIP IN DIESEL LUBRICATION

These "Caterpillar" Diesel tractors employed in strip mining are lubricated with Sinclair Ten-ol and other Sinclair products.

SINCLAIR TEN-OL

REG. U. S. PAT. OFF.

Less than a year ago Sinclair introduced Ten-ol, a lubricant as rugged in service performance as the "Caterpillar" Diesel engines for which it was developed.

Wide acceptance put Ten-ol to the most convincing of tests—showdown of performance under the toughest operating conditions. For example, in mining and quarrying... in road building... on public projects.

"Caterpillar" Diesel operators find Ten-ol increasing service hours, giving sustained top-notch engine perform-

ance, and providing full lubricating protection under emergency overloads. That's why it is recommended as a "new, outstanding Diesel engine lubricant" by Caterpillar Tractor Co.

Try Sinclair Ten-ol and Sinclair Diesel fuel. Order them and other Sinclair products from your local Sinclair office, or write Sinclair Refining Company (Inc.), 630 Fifth Avenue, New York, N. Y.

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SINCLAIR TEN-OL

is recommended as a "new outstanding Diesel engine lubricant" by Caterpillar Tractor Co.



Complete Line
of
**DERRICKS
and
WINCHES**

SASGEN DERRICK CO.
2101 W. Grand Ave., CHICAGO, ILL.



The New Good Roads Model S Sander

New Trailing Sander Promotes Road Safety

A new street and highway sander which spreads a swathe 25 feet wide when the truck pulling it is traveling at 10 miles per hour, and which is readily attachable to any make of dump truck, has been announced by the Good Roads Machinery Corp., Kennett Square, Pa.

This single-wheeled Model S rotating disc sander is fed either by hand shovel or through a chute placed in the tail-gate of the truck. Material passes from the 26 x 30-inch hopper over a cone agitator and is spread by the spinner disc. This disc is mounted on a vertical shaft set in Timken bearings and is geared to the single pneumatic-tired wheel on which the spreader rests. The wheel turns with an axle set in roller bearings.

The truck attachment consists of a steel angle support bolted to each side of the truck frame by hook bolts and adjusting racks. Across these is bolted a third piece to take the spreader drawbar. The spreader is quickly and easily fastened to lugs on this cross angle by means of a pin and latch, providing a hinge which permits the spreader to follow the contour of the road.

This new Model S sander is described and illustrated in Bulletin No. 1037, copies of which may be secured by interested state, county and township highway engineers and contractors direct from the Good Roads Machinery Corp. by mentioning this magazine.

Pump Factory Enlarged for New Light-Weight Pumps

Marlow Pumps, Ridgewood, N.J., is completing an addition to the centrifugal pump factory which will double the previous floor space. This is to

take care of the increased business in light-weight pumps, a new model of which, made of aluminum in 2 and 3-inch sizes has just been announced. These units will follow in general design previous Marlow models.

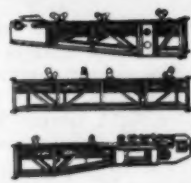
Five Personnel Changes At Caterpillar Tractor Co.

Five important changes in the organization of the Caterpillar Tractor Co., of Peoria, Ill., have been announced recently. C. Parker Holt, formerly Executive Vice President, has returned to the San Leandro, Calif., office of the company where, as Vice President, he will direct all Caterpillar activities and coordinate the work of the several departments with the headquarters at Peoria. A. T. Brown, formerly Vice President for the administration of the accounting, treasury, traffic and parts departments, succeeds Mr. Holt as Executive Vice President in Peoria.

L. B. Neumiller, formerly director of industrial relations, has been made Vice President in charge of the parts, service and traffic departments as well as the active management of industrial relations, and D. G. Sherwin has been advanced from Treasurer to Vice

President administering the advertising, sales and treasury departments. D. A. Robison, formerly Assistant Treasurer, has been elected Treasurer to fill the vacancy created by Mr. Sherwin's promotion. The newly elected officers assumed their duties in November.

NEW WAYS TO CUT MATERIALS HANDLING COSTS



The flexibility and adaptability of the Porta "Model 347" sectional conveyor offers wide opportunities for cutting costs and increasing profit in the handling of concrete and aggregates.

Made up of independent sections.

Can be used on wheel truck, castor mounting or on supports as permanent or semi-permanent conveyor.

Easily disassembled, easily transported, easily reassembled. Our catalog describes our complete line of portable, sectional, and permanent conveyors designed to suit every contractor's requirement.

PORTABLE MACHINERY CO., York, Pa., Clifton, N. J., Chicago, Ill.



WRITE FOR THIS BOOK



● What are the two obvious trends in portable crushing operations today? The quickest and best way to settle this and many other important questions about portable crushing, screening and loading plants is to send for this new, illustrated 24-page Tel-smith book. It tells you many things you want to know—

Is the demand for 2-crusher and 3-crusher plants increasing? Which is superior... the "dual plant," with both crushers mounted on a single truck... or the "tandem plant" which is a coarse crusher, with separate truck and power plant, preceding a secondary crusher in closed circuit with elevator and screen? What are the advantages and disadvantages of each? Which is preferable—in crushing quarry rock—in the preparation of bank gravel? All these matters are fully discussed in Tel-smith's new Portable book, Bulletin P-34—yours for the asking.

SMITH ENGINEERING WORKS

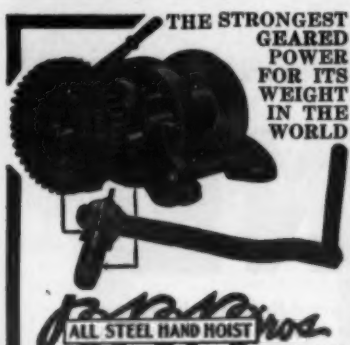
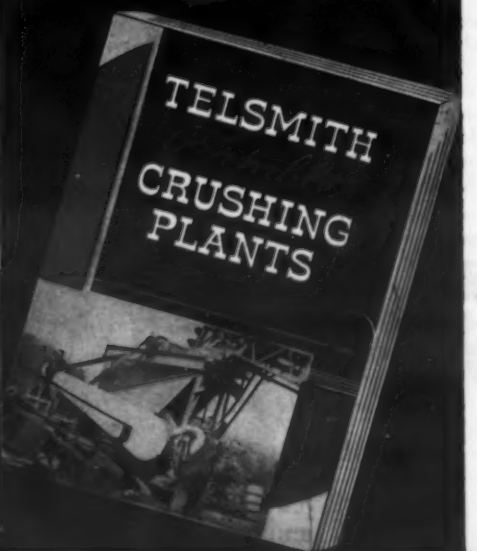
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A No. 30 Tel-smith Portable Crushing-Screening-Loading Plant operated by Huron County Road Commission, Bad Axe, Mich.

IT'S FREE



THE STRONGEST GEARED POWER FOR ITS WEIGHT IN THE WORLD

ALL STEEL HAND HOIST

SEATTLE, U.S.A. TRADE MARK REGISTERED
 COMPACT—POWERFUL—SAFE
 "For use where power is not practical or available"
 Manufactured in 2, 5 and 15-Ton Sizes.
 For capacity comparison, 1/2" cable used:
 2-Ton "Lightweight" 75 ft.
 5-Ton "General Utility" 250 ft.
 15-Ton Triple-Geared "Special" 1200 ft.
 Patent instant gear change and positive internal brake that never fails, and will lock load.

| Gear Ratios | Weight | Price |
|-------------------------|---------|-------|
| 2-Ton 4 & 22 to 1 | 60 lb. | \$60 |
| 5-Ton 4 & 24 to 1 | 110 lb. | \$75 |
| 15-Ton 4, 19 & 109 to 1 | 600 lb. | \$200 |

BEEBE BROS.
 3724 6th Ave., So., SEATTLE, WASH.

Warehouse stocks for dealers' supply: Seattle—Chicago—Brooklyn—Houston. Complete literature and list of dealers in principal U. S. Cities and Foreign Countries Gladly Mailed.

Hand Grouting Pump Made Double Acting

A hand-operated grouting pump which can be operated by one, two, three or four men, depending on the size of the work to be done, the speed with which the material is to be pumped and the pressure against which the grout is to be delivered, is manufactured by W. & B. Douglas Pump Co., 6245 State Rd., Philadelphia, Pa. This high-pressure Douglas pump No. 107 is designed for grouting work only. The construction of

this pump, which superficially looks like the hand fire pumps of old, is such that by loosening a valve cap on the front of the machine all of the valves are exposed, permitting immediate and instant flushing of the entire mechanism with water when the day's grouting is done.

Many users of hand grout pumps claim that the men at the handles get the "feel" or back pressure, so that they know exactly how hard they should pump and how full the job is, which guides them in grouting porous or seamy rock.

New 15-Yard Buggy

A new 15-yard pneumatic-tired buggy, designed for rock or dirt-moving jobs where the excavation is done by shovel or dragline, and similar in design to its 24 and 30-yard buggies, has been announced by R. G. Le Tourneau, Inc., of Peoria, Ill., and Stockton, Calif.

This buggy, which the manufacturer claims is maneuvered like a two-wheel cart, has the same positive dumping action of the larger models. In unloading, the body moves backward over the bed, pushing the load through an ever-wid-

ening opening to the rear, so that the wheels do not travel over the material as it is unloading. Extended, this opening is 7 feet 10 inches by 9 feet 10 inches, large enough to unload boulders. The unit is equipped with four 18 x 24 pneumatic tires and Timken bearings.

Like all Le Tourneau equipment, this buggy is made of alloy steel, arc-welded throughout. The bottom is wood-filled and stoutly reinforced. It is built for use with Caterpillar RD7 and RD8 tractors, and is cable-controlled by a Le Tourneau single-drum power control unit.

WINTER and SUMMER

YOUR BEST BET IS
ADAMS
MOTOR GRADERS

● Do you want a motor grader that handles the heaviest kind of maintenance, scarifying, and oil-mix, and one that will even build complete roads from ditch to ditch including backsloping? Do you want a grader that plows its way through snow which stalls other machines? Then investigate Adams heavy-duty motor graders with 59 h.p. gas and 62 h.p. Diesel power.

For heavy to average maintenance and snow removal Adams offers two popular-priced models

with 57 h.p. and 42 h.p. engines. Then, for the lighter maintenance and snow removal, there is the new, low-priced model shown below.

In the Adams range of five models you will find exactly the machine you need and for both winter and summer work you will find it to be your best bet. Your local Adams representative can tell you why; if he is not in touch with you, please address

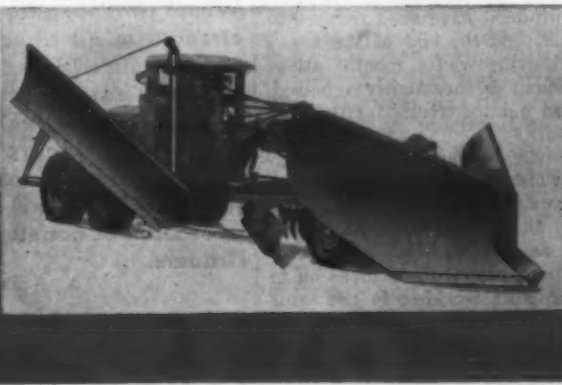
J. D. ADAMS COMPANY • Indianapolis, Ind.
Branches, Representatives & Distributors throughout United States



READY TO FIGHT YOUR SNOW BATTLES

Left: Small grader with reversible blade snow plow. Ideal for clearing town streets.

Right: Heavy-duty grader with snow plow and wing for clearing county and state highways. Its capacity is unequalled in the field of motor graders.



The Human Side Of Contracting

Contractor with 25 Years of Experience Outlines Method Of Moulding Green Men and Equipment into Unit

By FRANK CREASON,
Highway Contractor, Liberty, Mo.

SOME 25 years ago I began in a small way in concrete construction, such as city sidewalks, cellars and foundations. This led me to county culvert and bridge construction and then to larger bridge jobs. In 1924 I began doing concrete road work for state highway departments. I have continued in this line of work and feel that I am in a position to comment on the leadership, organization and equipment which will obtain the best results in concrete paving work.

Organization of Job

At the beginning of a job, after the equipment has been shipped to the site and unloaded, the plant set up and made ready for handling materials, and the necessary equipment distributed out on the road where the job is to be done, the first and main task is to assign the laborers to their particular jobs. I observe closely the work each laborer is doing and if I find him better suited to a different task, he is immediately transferred. By doing this, a contractor can obtain a maximum amount of work from a laborer with the minimum amount of effort on his part and completely satisfy the superintendent in charge. In most cases, a reasonable amount of friendliness on the part of the contractor toward the employees will in a few days, on an average construction job, result in some real team work. As an example of this, we not long ago completed a job on which during one week our organization completed one mile of 20-foot concrete pavement in 52 working hours.

Another example of the result of team work on the job occurred on another job of ours. One thousand car loads of material was used and to avoid shut-downs on account of lack of material and at the same time eliminate demurrage require care and thought on the part of the man in charge. On this job, we had no demurrage whatever and no shut-downs occurred because of lack of material.

Many of our key men have been in our employ for the past 12 years, starting in minor jobs and now operating cranes, pavers, rollers and similar equipment and they are drawing top wages.

Equipment

This is an extremely important factor in the successful operation of a job. At the beginning of each of our jobs I inspect thoroughly each piece of equipment to discover worn parts or breakage. Each piece of equipment is thoroughly cleaned and repaired, and worn or broken parts replaced by new ones. In this way, delays and shut-downs from broken equipment have been reduced to a minimum. At the end of the year's work, during the winter months all of our equipment is thoroughly repaired, cleaned and painted, ready for the next season's work.

During the construction season I continue to watch all equipment to see what, if any, improvements could be made. In the past I have improved several pieces of road-building equipment and have passed these ideas on to other contractors working in the same general territory and they are now using them. Because of my interest in construction, I think it worth while for con-

tractors and superintendents to exchange ideas.

Leadership

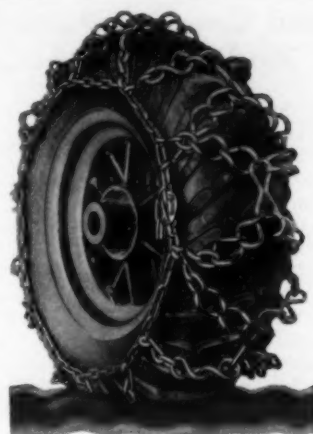
I think it is the duty of every contractor and his superintendent, if possible, to show and explain his task to each employee, be patient, teach him the importance of doing his work well and working up to a better job. He should emphasize the importance of a safety-first program and caution all employees who violate the principles of safety in their work. By doing this, we have cut our accidents and insurance rates to a minimum. He should also set a good example morally, physically and mentally. A friendly attitude toward the men working for you will secure their confidence and you will build a sound organization, contented and efficient, which will make your work a pleasure.

A. R. B. A. JAN. 17-21

Tractor Tire Chains

Mogul tire chains for use on heavy-duty tractors and trucks in the construction industry are specially designed and built to provide traction for this type of equipment when working on soft ground or mud or on slippery, icy roads. These new chains, made by the Pyrene Mfg. Co., 560 Belmont Ave., Newark, N. J., are designed to eliminate strain caused by unequal or irregular traction, to provide steady, uniform traction without slipping or "grabbing," and to prolong productive life with minimum cost for repairs and replacements, according to the manufacturer.

The sturdy spiral open links used for these chains give large low pressure tires a firm grip in soft ground. Also these links tend to roll sufficiently to tighten the chain and eliminate the need for adjusters or tighteners, but without causing tire damage. Complete infor-



The New Mogul Tire Chain for Tractors and Trucks

mation on these chains is contained in literature which may be secured direct from the manufacturer.

THE MACHINES OF Stability

MOTOR AND DRAWN GRADERS, TANDEN DRIVES, STEERING



Stability is the watchword in the manufacture of WARCO Motor Graders. Not only do these machines possess all the latest features required by the modern road builders, but they are outstanding in their Durability and Performance.

Distinctly a Heavy Construction Type Blade Grader is the new WARCO Power Controlled, Tubular Frame, High-Lift, Leaning-Wheel Grader—affording greater strength in all directions, unobstructed view, higher lift of blade for bank cutting and complete freedom from weak or tricky gadgets, yet incorporating all the required movements or adjustments for the successful operation of construction type Graders.



QUALITY • PERFORMANCE

Pittsburgh Co. Installs Batching, Loading Plant

The general increase in construction activities and the resultant demand for concrete have been responsible for the installation by the McCrady-Rodgers Co., of Pittsburgh, of a new high-capacity Blaw-Knox batching and Trukmixer loading plant at its Verona yards.

The main batching plant for aggregates and cement is the largest and most modern plant of its type in the Pittsburgh area. The aggregate bin has a capacity of 300 tons and is divided into four compartments in line. The batching plant is equipped with a 4-cubic-yard four-material weighing batcher with a four-beam scale. On the platform of the aggregate bin is located an automatic water volume-measuring tank to provide accurate measurements of the water used in truck-mixer operations.

Cement is weighed on a 4,000-pound cement weighing hopper which is located on the platform of the aggregate bin alongside the aggregate weighing batcher. Beneath these weighing batchers are suspended the confining chutes for loading batches into all sizes and types of truck mixers, as well as into batch trucks.

Aggregates will be delivered to the plant by barge and unloaded to the overhead storage bins by a stiffleg derrick with hoist installed on the river bank. The plant, with one-man operation, will be able to load out accurately measured batches for all classes of concrete for construction projects.

Future plans call for the installation of a complete bulk cement plant for unloading the cement from hopper-bottom cars and include an automatic screw conveyor which will carry the cement from the storage bin to the weighing batcher.



McCrady-Rodgers Co.'s New Blaw-Knox Batching and Loading Plant at its Verona Yards in Pittsburgh, Pa.

One-Way Traffic On Highway Jobs

"Please Take Mystery Out Of the Wildly Waved Red Flag" Say Motorists; Here Are Some of the Ways

"HEY, where do you think you're going? Didn't you see me wave my flag?" bawls the flagman, while the irate motorist wonders what intricate pattern of waving of a red flag means. "Come on." Most motorists have had just that experience, as we have many times in the last ten years of driving throughout the country. How can we overcome the meaningless waving of red flags and also prevent traffic tie-ups and tangles on one-way construction roads?

There are perhaps three types of conditions and there are solutions for each. First we have the case where the two flagmen cannot see each other at the two ends of a one-way construction road. That is easily solved by the time-honored red flag passed to the last car in the line, or by telephone communication. Where the distance is not long and it is possible for one man located on high ground midway between the ends to see, the recent development of a traffic signal for this condition seems to solve the problem excellently.

Now we come to the most frequent situation, a short distance where the flagmen can see each other. These occur where there is a culvert half poured and traffic must pass on one side, also where some blasting has been done and the road closed on one side while the shovel works to clear the full width. There are many other situations, they might be multiplied without end, but these serve to illustrate the condition that we feel can be taken care of without the least bit of misunderstanding on the part of the flagmen or the motorist.

The railroads in many parts of the country where the main-line tracks run across city streets have used hand signs bearing the word "STOP" plainly printed across both sides of the sign so that no matter which way it was held the vehicle driver knew what to do. We are taking pattern by that and developing a scheme used first by Kelly & Underwood Construction Co. of Granby, Mo.

First, the signs will not be used for a long period of time but must be able to stand the gaff of rough handling while they are in use. They must be big enough to be seen for say a quarter of a mile, although we do not require that the words on the sign be visible or legible for that distance. We suggest that the signs be made 2 feet in diameter of ordinary wall board and be mounted on some convenient handle made of a 2x4. The handle may be short or long so that the sign can be stood up at the proper elevation to be seen readily, and so as not to tire the flagman using it. These suggestions are merely trifles compared to the following, or in other words, "this is only the beginning, folks, only the beginning."

The front of the two signs, for one pair of flagmen, will be painted white with "Stop" in red letters on it. The reverse of the signs will be painted yellow and have "Go Slowly" painted on it in black. The yellow is for caution and uses the standard color of traffic engineers.

Now let us get out on the road and use these two signs. Flagman A is going to stop traffic so that Flagman B can let his line of cars go through. A holds his sign so that the traffic ap-

(Continued on page 40)

TIME PROVEN

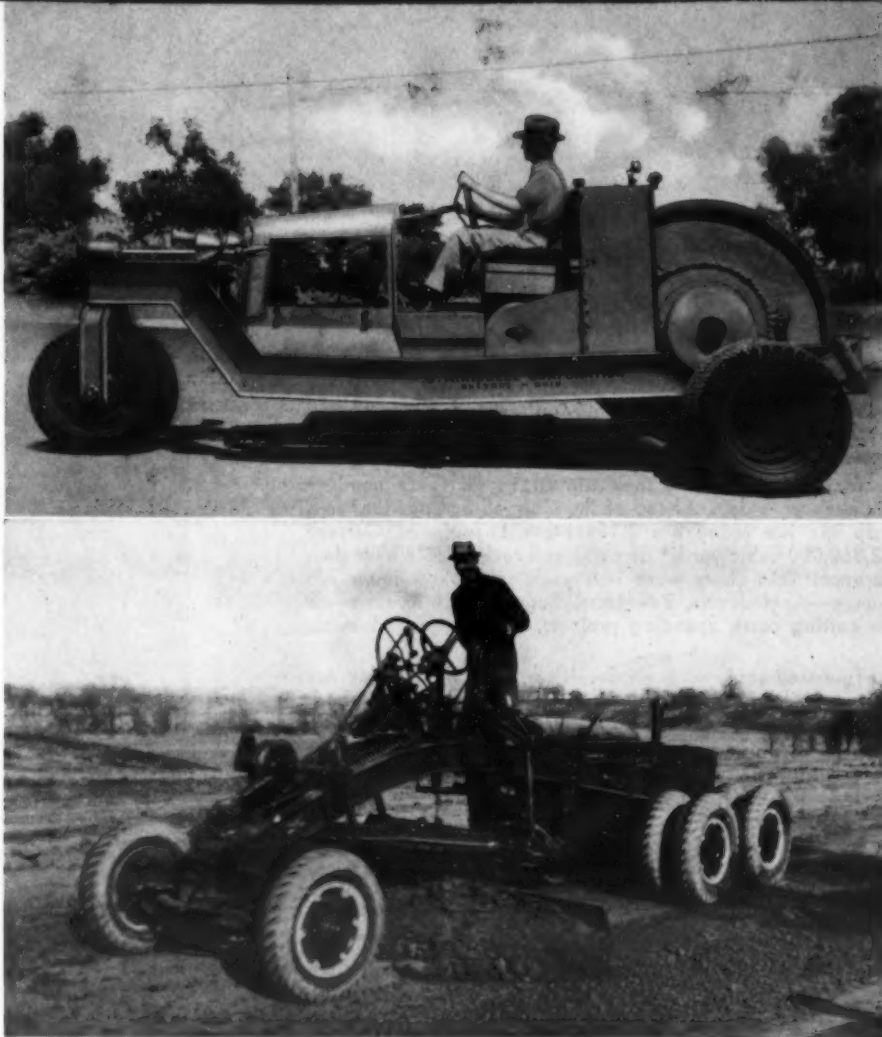
Reliability!

ROLLERS, ROLLERS, WHEELED SCOOPS, SNOW PLOWS

The New WARCO Road Roller is easily and quickly moved from job to job by simply lowering a pair of pneumatic-tired rear wheels, raising the Roller clear of the ground. Roller can then be driven at truck speed to the next job.

The ever-popular WARCO Center-Control Models have truly Made Their Way by the Way They Are Made. The improved Model "H," giving greater weight, added strength, gasoline or diesel power, greater blade range, added blade pressure, easier manipulation of the blade and greatly increased production by use of the WARCO Autopilot (8-Wheel) Drive, is rapidly becoming the contractor's favorite.

Don't fail to see these Four WARCOs at the Road Show to be held in Cleveland, January 17th to 21st, inclusive. Look us up at Space C-34.



W. A. RIDDELL CORPORATION

UCYRUS • OHIO "It's WARCO again!"

ECONOMY • DURABILITY

New 1½-Ton Motor Truck

Included in the new truck models shown by Dodge Bros., Division of Chrysler Corp., Detroit, Mich., at the Automobile Show in New York City was a 1½-ton model for general service which is available in wheelbase lengths of 126½, 133 and 159 inches and in gross weight ratings of 9,500 and 11,500 pounds.

The model with the 9,500-pound rating is powered with a 3⅜ x 4 1/16 engine, developing 73 hp. Features of this truck are the four-bearing crank

shaft with large main-bearing area; water distributor tube; by-pass thermostat; full-length water jackets; exhaust valve seat inserts; and 10-inch clutch with a permanently lubricated ball-bearing clutch release. It also has four-speed transmission, roller-bearing universal joints, an X-type cross member added to the sturdy frame of the chassis, a safety-steel cab, extra length in the rear springs, and a seamless one-piece axle housing. The hydraulic brakes have large stepped-bore wheel-cylinders which equalize the wear on the brake shoes.

The 1½-ton model with a 11,500-

pound gross rating has a 78-hp engine and is featured by a standard full-floating rear axle with a seamless one-piece housing expanded at the center for the mounting of the differential carrier assembly and contracted at the outer ends to receive the large wheel bearings. The spring seat is electrically welded to the one-piece housing, after which the entire housing unit is heat-treated.

There is also a new 2-ton Dodge truck, with a gross weight rating of 13,500 pounds, wheelbase lengths of 133, 148, 159, 177 and 220 inches, and powered with an 85-hp, 3⅜ x 4½-inch engine.

State Road Departments Now Using Diesel Power

The fact that state highway departments are increasingly using diesel power for construction and maintenance equipment is brought out forcibly in a new 24-page illustrated booklet, Form 4379, which may be secured direct from the Caterpillar Tractor Co., Peoria, Ill., by mentioning this magazine.

This pamphlet contains a remarkable series of photographs of tractors, auto patrols, power shovels, crushing plants, sand and gravel plants, etc.



Cheaper excavation! Lower cost materials moving! Speed—more speed! The equipment *must* permit a profit; finish contracts on schedule! The echo of contractors' demands of LeTourneau is heard the world over.

LeTourneau factories are doing their utmost to fill these needs—twenty-four hours each week-day. Ahead of the Carryall Scraper that rolls out of the factory and onto the job today are 2,344 other LeTourneau Carryall Scrapers. Enough to move 2,860,000 cubic yards* of earth and rock in a 22-hour day. 1,044 more LeTourneau Scrapers than there were one year ago. And there are enough other LeTourneau units—Angledozer, Bulldozers, Buggies and Rooters—to double that figure. They're cutting costs, speeding projects, both large and small, to a profitable conclusion.

See for yourself what LeTourneau equipment will do. It's working day in, day out—in mud, gumbo, sand and rock. Blistering heat and sub-zero cold affect this rugged, all-weather equipment's operating economies but little. Part of the reason lies in the LeTourneau principle of cable control on all equipment. Its trigger-quick action gives split-second positive control regardless of temperature or weather. Stout construction of the finest alloy steel, welded into one piece *keeps* LeTourneau units on the job constantly producing results—and profits.

Watch it work! There's a LeTourneau fleet owner near you. Compare their operating costs. Actual Job Data, certified for accuracy is available. Ask our Field Engineering Department for job studies similar to your undertaking. Or see your "Caterpillar" Dealer for a demonstration.

*Based on a very conservative average of 50 pay yards hourly on a 1,000-foot one-way haul.



ACTUAL
JOB DATA

EXCAVATING WET, STICKY CLAY and mud did not stop Contractors Potts & Callahan on an excavation job near Washington, D. C. Their LeTourneau U-12 Carryall Scraper and "Caterpillar" D8 Tractor combination loaded to heaping measure in 110 feet, requiring but 1.3 minutes, on a maximum 8% favorable grade. Round trip hauls of 2200 feet averaged 8.2 minutes—14 loads in 1 hour, 55 minutes. At 8 excavation yards per load, a long proved certainty, this means 112 yds. per hour. Tough digging and carrying 15 profitable.

LETOURNEAU

R. G. LeTOURNEAU, Inc. • Peoria, Illinois • Stockton, California • Cable Address: "Bobletorno"

Manufacturers of: Angledozer*, Buggies*, Bulldozers, Carryall* Scrapers, Cranes, Drag Scrapers, Rooters*, Power Control Units, Treedozer*

*Name Registered U. S. Patent Office

Huge Clamshell Dredges Build Atchafalaya Levees

**Dredge Cairo Has Averaged
118,400 Cubic Yards Gross
Per Month on Contract of
United Dredging Co.**

(Photo on page 48)

THE work of the dredge Cairo of the United Dredging Co., of New Orleans, La., in the Atchafalaya Floodway during 1937 consisted of placing 1,020,000 cubic yards of solid material in Item J of the Bayou Sorrel-Bayou Long levee. The gross height of this levee is 16 to 18 feet and the material was put on in 5 to 6-foot lifts. The base subsided from 3 to 8 feet while the shrinkage of the material placed was about 5 feet. The U. S. E. D. specifications require an allowance of 25 per cent by volume for shrinkage in material placed by clamshell dredges. The material consisted of 60 per cent clay, 10 per cent sand, 15 per cent silt, 10 per cent humus and 5 per cent other materials.

The final levee section will be a 10-foot crown with a 1 on 5.5 slope in both directions and with a false berm 40 feet wide on the river side beginning at a point 10 feet below net grade, 80 feet wide on the land side beginning at a point 5 to 8 feet below net grade and the slopes of the berms on both sides being 1 on 20. This levee will be enlarged in two or more years to an ultimate crown of 20 feet.

In the construction of this levee the Cairo employed three or more lifts, taking the material from the river-side borrow pits at varying distances as best suited the volume and lift required. The first lift was mostly built with material dredged from the flotation cut ranging from 140 to 240 feet from the center line of the levee and at a maximum depth of 10 feet, and from a pit 260 to 340 feet from the center line at a depth of 10 feet maximum. The second lift was dredged at 270 to 360 feet from the center line and at a maximum depth of 28 feet. The third lift came mostly from a pit 270 to 390 feet from the center line and at a maximum depth of 29 feet.

The Dredge Cairo

The Cairo was built in 1929 and consists of a barge 150 x 70 feet with a draft of 14 feet. It is powered with two 300-hp steam boilers and carries a 240-foot wood boom in which the main

member is a 24 x 28-inch stick. The plumb reach of the boom is 219 feet 8 inches and the effective reach beyond the barge is 184 feet 4 inches. The boom is not equipped with a power swing but swings merely by gravity, using a 5/8-inch steel cable for dumping and loading. The working draft of the dredge is 10 feet and the towing draft is 7 1/2 feet.

There are four spuds, three 36 x 36 inches and one 31 x 30 inches, all wood and each 72 feet long. The two main engines are 420-hp each and the two spud engines are 60-hp each. The full crew consists of 24 men working in three

8-hour shifts. The dredge swings a 6 1/2-yard bucket.

Other Equipment

On the dry sections and for rehandling material for the levee the contractor used two P & H 1-yard draglines. For dressing the levee slopes and topping off, the contractor used one Caterpillar RD7 and one RD6 with LeTourneau bulldozers.

Personnel

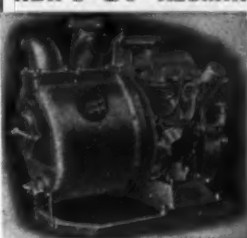
This work is under the direction of the Second New Orleans District, U. S. Engineer Department, Lieut. Col. William F. Tompkins, District Engineer, and Capt. Chester K. Harding, Area Engineer.

Contractors Working On Baton Rouge Bridge

As mentioned in the October issue of CONTRACTORS AND ENGINEERS MONTHLY on page 10, the new bridge over the Mississippi River at Baton Rouge

started to become a reality in August. The contractors for this \$8,360,528 structure are: river piers, The Kansas City Bridge Co., Kansas City, Mo.; river spans, The Bethlehem Steel Co., Bethlehem, Pa.; foundations for the approaches, Uvalde Construction Co.; structural steel, trackage and incidental items in the approaches, The Steel Construction Company, Birmingham, Alabama.

NEW 2" & 3" ALUMINUM PUMPS



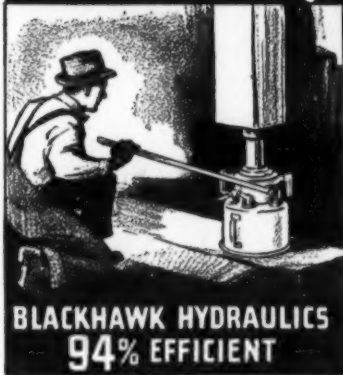
Lightest weight, 2" size, 98 lbs., 3" size, 108 lbs. 4-cycle engine, speed control, foot and rope starter — available without change. Automatic recirculation control, oil seal, etc.

Ask for Bulletin CEM-22.

Model 2-Fig. 22
MARLOW PUMPS,

RIDGEWOOD, N. J.

HYDRAULIC JACKS *multiply* MAN POWER



BLACKHAWK HYDRAULICS
94% EFFICIENT



SCREW TYPE JACKS
12 to 30% EFFICIENT

Blackhawk Jacks are 94% Efficient

All but 6% of the energy used in operating a Blackhawk Hydraulic Jack is live, useful power. The small loss is caused by the few minor MECHANICAL devices necessary to operate a hydraulic jack.

Screw Jacks are chained to a low operating efficiency of from 12% to 30% by FRICTION. Blackhawk Hydraulic Jacks — with all working parts immersed in oil — are 94% efficient!

One man operating a Blackhawk Hydraulic, rated at 30 tons, easily raises a 30-ton load. The average screw jack — equally rated — raises the same load PROVIDED enough men are on the end of the bar! Blackhawk Hydraulic Jacks make quick, easy work of difficult jobs because of smooth, dependable power, high efficiency and accurately controlled lowering. Engineers and workmen become giants when Blackhawk Hydraulics are on the crew. Over a score of Blackhawk Hydraulic Jacks — from 1 to 75-ton capacity — serve the engineering, industrial and automotive field.

Blackhawk Engineers offer counsel on your construction problems. There is no obligation. Just write —
BLACKHAWK MFG. COMPANY
DEPT. CEM-12 MILWAUKEE, WISCONSIN

Exclusive Canadian Distributor
THE CANADIAN FAIRBANKS-MORSE CO., LIMITED
Branches in all Principal Cities



Model K-18 Extra Heavy-Lift 75-ton Jack. High and low pressure pumps for speed and lifting. 18" low, 9" hydraulic lift, 27" high.



Model EA-11 Heavy-Lift 20-ton Jack. Compact, portable, safe, powerful, unbreakable. 11" low, 6 1/2" hydraulic lift, 17 1/2" high.



Model H-14 Floor Lift Jack. Lifts 12 tons from 1 3/4" off the floor — 20 tons from top of ram. 14 1/2" low, 7 1/2" hydraulic lift, 22" high.



One man, with easy strokes on handle of K-18 pushed over this concrete wall, saving days of back-breaking hand methods.

WON'T QUIT or cause time out



A Hayward Bucket keeps the job going ahead on scheduled time. It won't quit or cause time out.

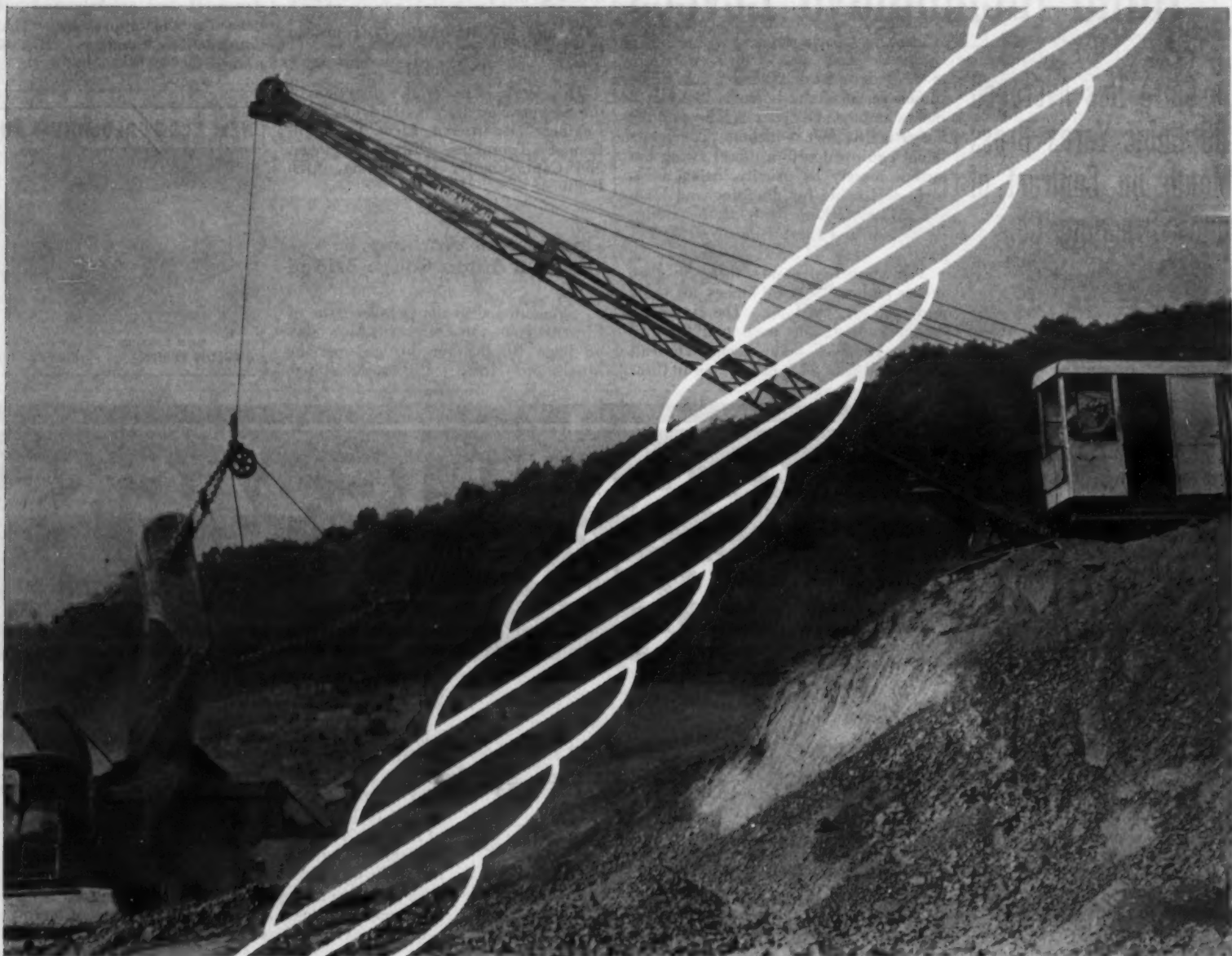
The Hayward Company

32-36 Dey Street
New York, N.Y.

Hayward Buckets

BLACKHAWK HYDRAULIC JACKS

It's know how *that counts*



in Wire Rope

And there's plenty of "know how" back of Bethlehem Wire Rope—the accumulated experience of half a century of wire-rope manufacture by the Williamsport Wire Rope Company, recently acquired by Bethlehem. Take Drag Line on a boom machine, for example. Highest-strength steel is always specified. 6x19 lang lay construction is universally used. Yet, even with these two points standardized among all rope makers, Bethlehem Drag Line has won high favor among contractors.

"Know how" enables Bethlehem to build a perfected drag line—having definite features, unique in Bethlehem Ropes, which combat abrasive wear and resist the whipping action of casting. For one thing, the strands, whether Form-Set (preformed) or standard, are "back turned." As wire is twisted into strand, the individual wires them-

selves are given a slight twist, making them hug together. Likewise, as the strands are twisted into rope, the individual strands are twisted slightly, making a tight, solid surface to the line . . . a surface that has greater resistance to abrasion. This same "back turning" of the wires and strands balances internal stresses of the rope and makes it less kinky, less likely to bird-cage, easier to handle.

A small point, perhaps. Yet any contractor familiar with Bethlehem (formerly Williamsport) Rope can immediately tell the difference. Bethlehem Rope casts better. It won't twist when let loose. It wears longer.

Whether it's Purple-Strand Perfected Drag Line, Purple-Strand Form-Set Hoist Line, or wire rope for some other use, you'll find this "know how" invariably present in Bethlehem Lines.

BETHLEHEM STEEL COMPANY



Snow Removal Work On Arizona's Roads

(Continued from page 1)

the record contained also a bit of the unexpected in a dramatic rescue that landed in the newspaper headlines.

Snowbound Near Grand Canyon

On the Grand Canyon rim, the highway department found a difficult testing ground for its newly purchased 175-horsepower Snogo rotary plow on a 47-mile stretch of highway from Jacobs Lake which was blocked by from 5 to 15 feet of heavy snow. This is not part of the state system and no plans had been made for opening it during the winter months. When an emergency arose, other equipment bogged down and the State Highway Department undertook the job putting the new Snogo to its first task.

At the end of the run were 32 persons snowbound for nearly two months in the Bright Angel Lodge of the Union Pacific Railroad, including members of a construction crew, and nearby Mrs. Alberta Cox, expectant mother in need of medical attention, and her husband. Supplies other than staples were nearly exhausted at the Lodge. The construction crew was reduced to a diet consisting largely of beans. Officials had planned to continue work throughout the winter, keeping the roads into Utah open with graders, which might have sufficed for a normal winter. Various efforts to cross the snow with tractors supplied with special track flanges failed.

On February 15 the crew of the Snogo turned the nose of the machine into the drifts, the heaviest on record, and began the rescue trip. Day and night the work went on, so slowly sometimes that the machine seemed barely to move. Snow was blown from the stack for a distance of 50 to 80 feet on both sides of the roadway. The drifts, left by a succession of storms, were surfaced with heavy crusts of ice.

Meanwhile, at the other end, repair crews patched up the Park Service telephone and a doctor gave instructions to Mrs. Cox and her husband, snowbound at V. T. Ranch, some distance from the Lodge. Fortunately, Cox, familiar with the snow hazard, had made provision in advance, and they suffered no deprivation. There was, however, the necessity of returning Mrs. Cox as soon as possible to the hospital facilities of civilization.

The breakdown of a tractor at the Lodge which was attempting to get through to the snow plow and the steadily diminishing supplies led sixteen of those snowbound there to attempt crossing the Grand Canyon. They dug their way down the north rim, roped together to prevent disaster on the narrow ice-covered trails, and finally reached Bright Angel Creek. It was necessary to cross the stream a half-dozen times, through snow water shoulder high, before the Colorado River nearly 12 miles from the rim was reached. The party camped at Roaring Springs on the first night and on February 22 reached the south rim of the canyon. The latter part of the jour-



Photo, Courtesy of Arizona Highways

The Snow Plow and Crew which Effected a Spectacular Rescue in Arizona's Mountain Passes Last Winter

ney was made on mule back, after help was sent from Grand Canyon, Arizona. For nearly 100 hours the rescue work

continued without a halt. At times progress was so slow that the snow plow moved but 2½ miles a day. The crews

worked in relays. After the plow had broken a smooth trail through the heaviest fall, tractors found a section which permitted crossing upon the snow, with the aid of improvised wooden track cleats. Mrs. Cox was removed from her imprisonment and rushed to Jacobs Lake, where Highway 89 was open, and taken to a Utah hospital.

The following day, the tractor, which had been repaired with parts ordered via a Park Service ranger's short-wave radio and delivered by airplane and parachute, broke through to where the snow plow was still digging into the heavy drifts and the remaining members of the construction crew were "evacuated" from their snow prison.

Routine Work

While the regular work of the department did not make the front-page headlines, the efficiency shown in this dramatic rescue was duplicated many times over during the unusually heavy winter. The standard snow removal procedure

(Continued on page 25)

THE *New* INTERNATIONAL PICK-UP TRUCKS IN 3 SIZES



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● In the new International Truck line special attention has been given the popular pick-up type of truck—from the standpoint of appearance as well as all-around utility. The men who design and build and test them took all the time that this kind of a job requires and put into these new Internationals all the experience that Harvester has gathered in more than thirty years of truck manufacture.

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INTERNATIONAL TRUCKS

Emergency Reservoir For Little Rock, Ark.

A 120,000,000-Gallon Storage Reservoir Built Close to City as Part Of New Water Project

(Photos on page 48)

A NEW source of water supply for Little Rock, Ark., has been under construction for nearly a year, including an earth dam and spillway at Alum Fork some 50 miles by road from the city, a 32.4-mile steel cylinder concrete pipe line 39 inches in diameter, and close to the city a 120,000,000-gallon emergency storage reservoir capable of supplying the city for a considerable period in case any damage occurred to the pipe line. This reservoir will serve an additional purpose, in that it is exactly on the hydraulic gradient and the upper few feet of its capacity can be used as an equalizing reservoir to iron out daily variations between water consumption in the city and the water released from Alum Fork reservoir.

The emergency reservoir is located about 1½ miles west of the city on State Route 10 and the major construction was the completion of a 243,000-cubic yard earth dam 1,700 feet long, 65 feet high at the maximum, 325 feet maximum width at the bottom and 20 feet wide at the top. The area of the reservoir is 25 acres and the high-water elevation 540 feet with a net drop of 30 feet in elevation between the reservoir and the Little Rock filter plant.

The contract for the construction of the emergency reservoir was awarded to S. E. Evans of Fort Smith, Ark., for \$96,611.85. Work was started early in June 1937, with 150 calendar days allowed for completion of the work.

Construction Equipment

The location was ideally situated for the use of tractor-drawn scrapers as the borrow was from the reservoir site after clearing and also from downstream borrow pits so that the scraper equipment went from one borrow area across the dam, depositing its load, and then to the other borrow area without losing a moment for turning or stopping. The contractor used three LeTourneau 12-yard Carryall scrapers and a 12-yard Austin-Western hydraulic-controlled scraper. In addition there were a LeTourneau roofer, and one Euclid and one Blaw-Knox sheepfoot roller. The hauling equipment consisted of two Caterpillar Seventy-Fives and two RD8's.

New Director of Sales For Marmon-Herrington

C. Alfred Campbell, well-known automotive advertising and sales promotion engineer, has been appointed General Sales Director of the Marmon-Herrington Co., Indianapolis, Ind. Mr. Campbell brings to his new position a wide experience in the automotive industry, particularly in commercial and industrial transportation units.

The Marmon-Herrington Co., the latest development of which is a small track-laying tractor, recently purchased the entire plant and machinery of Duesenberg Motors, Inc., in Indianapolis, consisting of two large modern factory buildings and a 15-acre tract of ground, to provide facilities for further business expansion. The company was in full production at the new plant on December 1. In addition to its regular line of all-wheel-drive trucks and track-laying tractors, this company converts Ford trucks into all-wheel-drive units.

The site of the dam was cleared, grubbed and stripped of top soil to a depth of 1 foot down to clay or shale, except in the bottom of the valley where a gravel bed 3 or 4 feet deep had to be removed to reach an impervious foundation. Then a cut-off trench 20 feet wide and 3 to 4 feet deep was dug and backfilled with good clay. The trench gradually reduced in depth to the ends where it was only 1 foot deep.

The total size of the two borrow pits was about 135 acres, providing an average haul of 1,500 feet and a maximum haul of 2,400 feet. Where a tough clay not readily picked up by the scrapers was encountered in the pits, the ripper was put in to break it up. Two of the Carryalls were worked separately and the third for a part of the time was teamed with the Austin-Western behind one tractor, providing the unusual combination of a cable-operated and a hydraulically operated scraper being handled from the same tractor.

Soil Requirements

A close control of the soil was made possible by the establishment of a field soil laboratory on the site under the direction of the consulting engineers. The material from the borrow pits was subjected to constant surveys and the moisture maintained at the optimum figure for maximum density of the material in the dam. The soil was spread

(Continued on page 38)

Toll Bridges Free

The Black-Hobbs Bill, passed at the last Congress, for the purpose of making free certain toll bridges on the Federal-Aid highway system has aroused much interest among highway engineers.

The Bill provides that the Secretary of Agriculture be authorized to pay to state highway departments not more than 50 per cent of the reasonable value or cost of construction of toll bridges on the Federal-Aid highway system, in order to make them free bridges the cost of the original construction of which was, of course, borne by the state highway departments.

Such bridges must have been constructed in accordance with plans and specifications meeting U. S. B. P. R. standards at the time the bridge was built and also must have been completed on or after March 3, 1927. The amounts so paid any state highway department shall be used for matching unobligated Federal-Aid road funds available to the state for expenditure in the improvement of highways on the Federal-Aid system. Through this measure, certain states will be enabled to meet Federal-Aid appropriations which might otherwise lapse, according to the American Road Builders' Association.

Employment Increases And So Do WPA Rolls

In discussing the employment situation at the meeting of the American Institute of Steel Construction convention in October, Edward L. Ryerson, Jr., Vice Chairman of Inland Steel Co., pointed out that American manufacturers have added 3,100,000 to their payrolls since the WPA was organized in 1935. These new workers total 65,000 more than were on the WPA payrolls at its peak on February 29, 1936. "And yet," added Mr. Ryerson, "the WPA on September 25, 1937, still had 1,452,774 workers on its projects!"

Business faces taxation beyond its

capacity to pay unless the great majority of employables now on WPA are, within a short period of time, encouraged or compelled to find jobs in private industry. Mr. Ryerson continued: "I am now convinced that the time has come when we must stop talking so much about industry and commerce making jobs available. Rather the emphasis must be placed upon the individual to find employment. We all know that there actually is a shortage of available labor in many trades. The obvious implication of our highly developed relief programs has been to create an attitude of mind that makes a large mass of our citizens assume that a job or its equivalent will be provided without the necessity of seeking one."

Mr. Ryerson, who is chairman of the Chicago Community Fund and former chairman of the Illinois Emergency Relief Commission, explained that the 1,300,000 families without employable members must be permanently cared for through taxation and private philanthropy. This necessitates the early removal of the million and a half now drawing wages on WPA projects.

State Road Expenditures

The total expenditures for roads in the state highway system in 1936 amounted to \$1,131,151,000. With the exception of the year 1930, this is the largest expenditure of any year since the establishment of the Federal Highway Act in 1921, according to the Annual Report of the Executive Secretary of the American Association of State Highway Officials. The sources of income, however, have greatly shifted. In 1930 Federal contributions proved 8 per cent while in 1936 Federal funds amounted to 30 per cent.

Gas and motor fee receipts have increased \$53,000,000 but this is not in keeping with the increase in vehicles on the highway. In 1930 gas tax and motor fees given to local roads amounted to \$164,802,000 but in 1936 these payments to local roads were increased to \$264,167,000. Thus almost \$100,000,000 of state funds have been transferred from state roads to county and local roads as a state legislative policy in the past six years.

Today less than 62 per cent of the gas tax and motor fees are placed in the state treasuries for the construction and maintenance of roads in the state systems. But this is not the whole story,

for ten state highway departments get less than 50 per cent and one must carry on its state road program on 21 per cent of these receipts.

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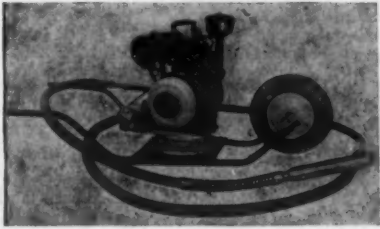
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The Roeth Concrete Vibrator Mounted On a Wheelbarrow Chassis

New High-Frequency Unit For Vibrating Concrete

The Roeth Model No. 1 flexible-shaft gasoline-engine-driven vibrator for mass concrete, made by the Roeth Vibrator Co., 1735 Farragut Ave., Chicago, Ill., has a normal vibrating speed of 6,000 rpm which may be increased to 7,500 rpm by a simple adjustment of the governor. The unit is powered by a 4-hp 4-cycle single-cylinder air-cooled Briggs & Stratton gasoline engine which is mounted on a stainless steel swivel base. Allis-Chalmers twin Texsteel sheaves are used, having a pulley ratio of 1 to 3. The large pulley is equipped with an automatic clutch which engages when the engine runs over 1,000 rpm and releases as the engine is throttled down to idle.

The countershaft is mounted in ball bearings which the manufacturer claims will give 2,000 hours of service without renewal of the bearings. The engine is powerful enough to maintain full speed while vibrating dry and stiff concrete mixtures. A new specially designed flexible shaft casing is furnished with the unit. The casing is constructed of high-quality rubber, with three layers of wire fabric vulcanized into the rubber, and an inside metal flexible tube prevents grease from coming in contact with the rubber. The casing comes in 7-foot lengths, is 1 3/4 inches in diameter and has a swivel at one end. The shaft core is made of Swedish steel wires, having a tensile strength of over 300,000 pounds. The vibrator head is designed for high speed and is furnished in 2, 2 1/2 and 3-inch diameters and is 16 inches long.

The unit is mounted on a wheelbarrow chassis with a 4-ply double tube tire 16 x 4 inches, or on a two-wheel chassis with 4-ply tires 12 x 3 inches in size.

Transportation Maps Available for 13 States

Large-scale maps showing all details of the existing transportation systems in thirteen states, including Federal-Aid and state highway systems, important secondary highway connections, air lanes and landing fields, railroads and navigable channels and canals, have been prepared by the U. S. Bureau of Public Roads in cooperation with the U. S. Geological Survey. The

maps are on a scale of 4 miles to the inch and are believed to be the most complete of the kind ever made. They are produced on sheets of uniform 26 x 36-inch size.

The type or character of pavement on each F-A or state highway as of the date of the maps is shown by appropriate symbol. The maps also show the location of all Federal and state areas and the roads leading to them.

The maps, in a varying number of sheets indicated by the numeral after the name of the state, are available for Connecticut (1), Delaware (2), Florida (12), Iowa (8), Maine (6), Maryland (3), New Hampshire (2), Oregon (12), Rhode Island (1), South Carolina (5), Vermont (2), and Washington (9) from the Superintendent of Documents, Government Printing Office, Washington, D.C., at 20 cents a sheet. These maps should be of particular value to state agencies and planning organizations.

A.R.B.A. Jan. 17-21, 1938

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"Sinking shafts through Manhattan bedrock is tough going," says Willard G. Triest, president of Triest Construction Co., contractors on the Manhattan shaft of the Manhattan-Queens Midtown Tunnel now building in New York City. "But CP Compressors can take it."

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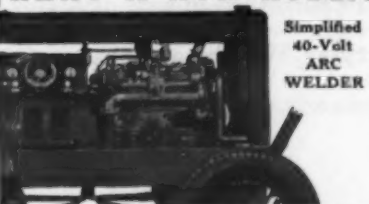
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Canal Construction On the Roza Project

**J. A. Terteling & Sons
Has Two Contracts on
Last Unit of Yakima,
Wash., Irrigation Project**

By HENRY W. YOUNG

(Photo on page 1)

THE last unit of the Yakima irrigation plan adopted by the United States Reclamation Service over 15 years ago is now under construction. This is known as the Roza Division, Yakima Irrigation Project, near Yakima, Wash. The Yakima River here parallels a strip of bench land nearly 100 miles long which, when irrigated, will be as productive as the famous fruit lands about Yakima. When the Roza Division is completed, approximately 72,000 acres of arid land will be brought into production.

The tortuous channel of the river is roughly north and south. A diversion dam is to be built north of Selah and about 10 miles from Yakima. Below this dam, not yet under contract, Tunnel No. 1 is now being constructed, cutting across a sharp bend in the river. Then comes somewhat over a mile of canal now being excavated to a point where it will "duck under" the river in an inverted siphon, which is also under construction.

Discharge from the siphon will be into a section of main canal now nearing completion and leading to the mouth of Tunnel No. 3, near the outskirts of Yakima. Passing through the latter tunnel, the water will emerge at the head of the long strip of land forming the Roza Division, thence passing south through more main canals to Tunnel No. 5, through that and then more main canals to the end of the project. Eventually, there will be about 100 miles of lined and unlined main canals and nearly 200 miles of laterals. All work south of Tunnel No. 3 is yet to be placed under contract. It is expected that Tunnel No. 5 will be through by 1940 and after that the southward march of the development completed as fast as practicable.

J. A. Terteling & Sons, with headquarters at Roza Project, Yakima, Wash., has the two contracts for the main canal, bench flume and siphon now being built. One of these is for approximately 5 miles on the east side of the river below the siphon. The excavation here is approximately 700,000 cubic yards, mostly cemented material. About one-third of this canal is to be lined. All the excavation has been completed, as well as a considerable portion of the finishing and lining.

Terteling's other contract is for the canal, bench flume and siphon between the first Terteling contract and the lower portal of Tunnel No. 1. This contains about 270,000 cubic yards of excavation, which is well on toward completion.

This short section, mostly on a hillside, contained some solid rock not particularly tough to negotiate. But much of the remainder is through loose sand in which boulders are hidden like plums in a pudding, some of them upwards of 3 cubic yards. When the dragline scraper encounters them there is terrific shock to the equipment, and the going is tough and slow as a consequence. All the excavation on both sides of the river has been accomplished by two Bucyrus-Erie 52-B draglines with 3-yard buckets, which have stood up to the work in good shape.

Certain phases of the main canal finishing and lining in the 5-mile section have also been completed. The main canal here has a cross-section 14 feet wide at the bottom, slopes 1 1/4 to one, and is approximately 55 feet wide at the top. The depth of water in the unlined sections is to be approximately 12.02 feet. The lined portions, on hill-sides where the cross slope is too steep and the soil too porous to permit the use of an unlined canal, will be approxi-

mately 11.2 feet deep.

Finishing and Lining

The finishing and lining operation is particularly interesting. First through the rough excavation comes the trimmer, drawn by a Caterpillar tractor and running on two narrow-gage tracks, one on each side of the canal. Teeth and blades on each side comb down the sides

(Continued on following page)

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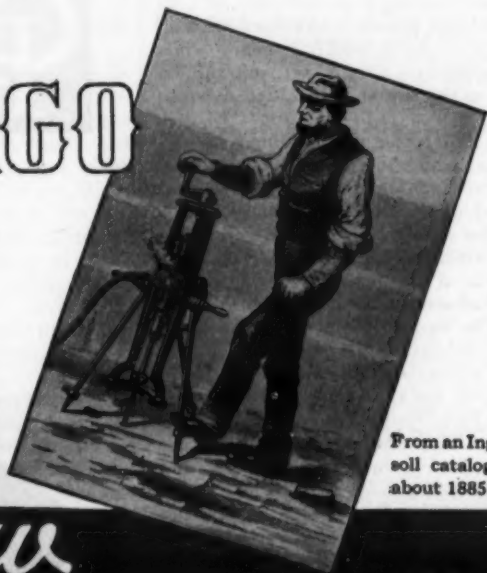
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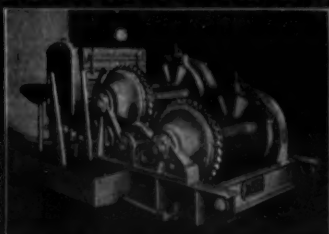
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Roza Project

(Continued from preceding page)

to the correct slope. Normally, its progress is through the rough grade, excess material being elevated and thrown over the sides by conveyors. This machine was built for use on the sand sections of the Los Angeles Aqueduct.

Following the trimmer comes a traveling staging, running on narrow-gauge tracks, constructed by the contractor for the purpose of covering a line of uncemented 6-inch drain tile laid under the lower angle next to the hillside. Cemented turn-out drains are taken off every 1,000 feet to remove the drainage from the main line of tile. The trench is dug by hand and the tile laid in position, after which it is covered with coarse gravel. This gravel is wheeled across the top of the staging and dumped down through a vertical chute into the trench.

A gang of slopers follow after the tile crew, working on cleated planks laid against the sides of the canal and with hand tools ironing out all the minor imperfections of the surface until the sides are as smooth as a floor.

The canal is then ready for the concrete reinforcing. This consists of 1/2-inch reinforcing steel laid on the sides and bottom, on 24-inch centers transversely and 12-inch centers longitudinally. Next comes the slip form which places the 4-inch-thick concrete lining. This runs under its own power on the two tracks. The mixer on the bank adjacent is a Rex paver, taking six sacks of cement per batch. The rate is approximately 2 minutes per cycle, the concrete being mixed for a 3 1/2-inch slump, so as not to run and to permit its being finished by trowelers, who work on two jumbos directly back of the form. This form was used on the Los Angeles Aqueduct and rebuilt for use here.

Last of all comes a staging, pushed along on the rails by hand, on which the paint crew operates. The whole surface of the concrete after the trowelers are through is given a curing coat consisting of a coal-tar cut-back. This seals in the moisture necessary to harden the concrete properly. One coat of the mixture is sprayed on at the rate of 175 square feet per gallon.

Personnel

C. E. Crowover, formerly City Engineer of Yakima, but who became associated with the Bureau of Reclamation two years ago, is Construction Engineer of the Roza Project.

Heavy-Duty Engines For Construction Field

Franklin Aircooled heavy-duty engines, made by Air Cooled Motors Corp., Syracuse, N. Y., are designed especially as power for trucks, tractors, compressors, and similar equipment in the construction field.

The feature of this engine is the direct air-cooling of its cylinders. Other features claimed for these engines by the manufacturer are their economical use of gasoline and oil; the extra-large seven-bearing crankshaft; extra-deep heavy-ribbed crankcase; individual chrome nickel-iron cylinders which can be individually serviced; airplane-type alum-

inum cylinder heads, valve-in-head type; force-feed metered lubrication system to all engine parts; rugged extra-size electrical units and easy-access design.

Complete specifications for this Model 6A-400 for use in trucks, as well as for the other Franklin Aircooled engines and power units, may be secured direct from manufacturer by mentioning this magazine.

Link-Belt Distributors

Link-Belt Company, 300 W. Pershing Road, Chicago, has announced the appointment of three new distributors for the sale of Speed-o-Matic shovels, draglines and cranes: TAG Equipment Co., Inc., 821 E. 11th Street, Chattanooga, Tenn.; Industrial Supply Co., 121-131 Motor Ave., Salt Lake City, Utah; and A. W. Company, Inc., of Minnesota, 2328 Territorial Road, St. Paul, Minn.

A.R.B.A. Jan. 17-21, 1938



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Furthermore . . . as efficiency-promoting new machines to be announced in 1938 will demonstrate . . . Austin-Western continues to blaze important trails of engineering achievement with equipment that will further accelerate progress in American road building.

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The Newest Aircooled Gasoline Engine

Stabilized Base On Missouri Road

(Continued from page 2)

tons of sand per station in order to bring up the gradation of the No. 40 material in the final mix to over 20 per cent as required. This applied to the gravel on the east end of the project, as the gravel obtained from the west end of the job contained considerably more material passing the No. 40 sieve.

The clay was dumped in an approximate windrow alongside the gravel windrow in the proper amount per station. Then it was flattened to 8 to 12 feet wide and worked by a series of agricultural discs pulled by a 10-20 International tractor and a Caterpillar Thirty. The disking was continued until the clods were broken up into pieces 2 inches or smaller in diameter so as to hasten the drying of the clay. When it was dry a Wheeled Roller was run over the material to crush the dried chunks. The working with the discs was then continued and a Caterpillar No. 11 motor patrol was used to cut the clay from the subgrade to which it clung when damp.

Intricate Mixing of Materials

With the pulverized dry clay spread to an 8 to 12-foot bed alongside the gravel windrow one of the graders was used to pull over about one-fifth of the gravel windrow across the clay. On the next run the two layers were thoroughly mixed and windrowed to the far side of the road and another fifth of the gravel spread across the same area. Then a part of the first mixed material was spread over the gravel, another fifth of the gravel spread and some more mixed material spread over it. One must remember that when mixing fines and coarse material it is well to spread the fines on top of the coarse material as the fines have a tendency to work down through the coarse material anyway. At the end of the alternate spreading a laminated layer of gravel and mixed material resulted. During the spreading and later when the actual mixing was going on, a spring-tooth harrow was pulled through the material to assist in the incorporation of the coarse and fine material.

About one-fifth of the laminated material was cut off with the blade and moved slightly to the left. Then the blade continued working the full depth of the laminated material, moving it to the left. It is comparatively easy to describe the mixing process where clay and gravel are concerned but in actual practice moving 2,600 tons to the mile is not so easy. In combining the gravel and clay windrows, as described above, it was found that it accomplished only about one-third of the necessary mixing. The whole material had to be bladed and moved across the road in series of small windrows and so handled that parts of mixed windrows were incorporated with new material.

This process was continued across the road, always taking a part of one or two smaller windrows each time and moving that material ahead so that the same material was never moved twice in succession as a unit.

Spreading the Base

After the mixing was completed and the material windrowed to the side, the exposed subgrade was sprinkled with water from three trucks carrying 1,000-gallon tanks equipped with a 2-inch perforated pipe 2 feet from the ground and with proper controls. The trucks used were a Chevrolet, a Ford V-8 and an International. The tanks were filled at the nearer creek using a Sterling 3-inch Water Boy pump.

As soon as a section of the subgrade

had been sprinkled the blades began moving the mix out across the road, spreading a layer and sprinkling it and repeating the process until the entire windrow was laid out across the road 20 feet wide. This gave an uncompacted layer about 5.5 inches thick which compacted to about 4.5 inches under rolling with a LaPlant-Choate sheepsfoot roller. A final rolling, not required by the specifications, was done with the Wheeled Roller to give a smooth surface not possible with this type of material under a sheepsfoot roller. All of the blade work on this job was done with an Austin 12-foot grader pulled by a Caterpillar Sixty and a Caterpillar No. 11 gas patrol.

Work on this contract was started June 10, 1937, and in order to insure

completion by September 1 the contractor put on a night shift. The original shifts were two in number from 5 A.M. to 12 noon, and 12 noon to 7 P.M. The night shifts were used as soon as blade men were available and ran from 7 P.M. to midnight and from midnight to 5 A.M., using the Caterpillar motor patrol only.

The contract for the construction of 9.201 miles of aggregate and clay stabilized base on Missouri Route 8 east of Steelville, FAP 810-A, B and C, was awarded to the Koss Construction Co. of Des Moines, Iowa, on its bid of \$23,951.60. V. C. Benderoff was Superintendent for the contractor and Orville Ratliff was Project Engineer on this contract for the Missouri State Highway Department.

Wagon Scrapers Start For Argentine Republic

One of the many large shipments of construction equipment to Latin America recently consisted of nine Continental wagon scrapers, made by the Continental Roll & Steel Foundry Co., East Chicago, Ind. The shipment included five 7-yard and four 5-yard units, all rubber-tire-equipped, taken from the manufacturer's stock of earth-moving equipment.

This and other large shipments to our South American neighbors is indicative of the road-building and construction projects which are being planned in Latin America and are going forward in that part of the world.

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Three Allis-Chalmers "LO" pulling a Gar Wood L-10 two Continental 7-yard scrapers. FASTER POWER enables these rigs to make more trips per shift, to move more yardage per horse power and to cut final yardage costs new and more profitable.

Model "LO" and Gar Wood L-10 loading in the cut Clarence Berg's highway location job on U. S. 16 at LaCrosse, Wis. FASTER POWER saves time on load and return, enables operator to make extra trips hourly.

ALLIS-CHALMERS
TRACTOR COMPANY

Federal Introduces Twelve Truck Models

Twelve new models, ranging from $\frac{3}{4}$ -ton to 5-ton capacities, have been announced by Federal Motor Truck Co., Detroit, Mich., to round out its 1938 line of 29 models, including conventional and cab-over-engine types. Henry Dreyfuss, designer of the "Mercury", New York Central's new streamlined train, has created a new design for these 1938 Federals. The front end appearance of the new trucks is distinguished by a new type radiator grille from which the hood sweeps back to the streamlined cab.

These models feature two spacious cabs designed for passenger car com-

fort, safety and increased driving vision. The dials and gages have been placed at the left of the new instrument panel and the dash controls have been assembled in a practical grouping at the center of the panel. At the right is a large locked compartment for delivery records and valuables.

The deluxe cab, distinguished by a V-type windshield, designed for wide driving vision, is completely lined with steel. The standard cab with steel roof lining has a wide 1-piece slanted windshield. Both cabs are completely weatherproofed and insulated against engine heat, cold and gas fumes, using heavy insulating material between the roof and headlining as well as on the dash. The new models are powered by a wide range of Hercules truck engines

designed exclusively for commercial truck use. Features common to all 6-cylinder engines powering Federal trucks are $2\frac{1}{2}$ -inch, 7-bearing crank shafts with electrically-hardened bearing surfaces, large full-length water jackets, positive gear-driven water pumps, force-feed lubrication, wide face, silent timing gears, air cleaners, oil filters and governors. Oil bath air-cleaners are used on 2 to $3\frac{1}{2}$ -ton units.

Four-speed transmissions are standard on all models under 3 to $4\frac{1}{2}$ -ton capacity. Models of 3 to $4\frac{1}{2}$ -ton capacity and over have five-speed transmission. Large 4-wheel hydraulic brakes are standard equipment throughout the line. All units of 2 to $3\frac{1}{2}$ -ton capacity and over are equipped with vacuum power boosters.

Arizona Snows Removed Rapidly

(Continued from page 19)

helped to prevent any serious difficulties on the main highways and the principal danger lay in the blocking of secondary routes. It was found that in unusual cases the delay on main routes could be minimized by closing them to traffic for perhaps an 8-hour period during the heaviest snowfall and drifting, holding the motorists in the towns, while the snow plows cleared the highways.

This plan was adopted to save motorists from the hazard of the intense cold, as the thermometer occasionally drops to 50 degrees below zero, and to allow the plows to work unobstructed rather than because careful drivers could not get through. Without this precaution, a large amount of the plow crews' time was likely to be spent in returning the cars of less careful drivers to the roadways.

Attention is given first to the main routes, and only when travel on these is assured are secondary routes opened. Except for the section on the north rim of Grand Canyon, scarcely a road is ever blocked for more than a few hours. Up to 3-foot drifts are handled by small rotaries deriving their power from the engines of heavy-duty trucks. Graders are used only where the snow is likely to melt before the arrival of a new storm. To avoid the necessity of return trips, the use of blade plows without provision for complete removal of snow from the roadway has been reduced to a minimum. The initial expense is greater but the job is more satisfactory, and subsequent operations in the event of a succession of storms are made easier. When heavy drifts are encountered, heavy-duty rotary plows are used.

As the snow storms are often local in character, equipment from districts not affected is rushed to the section where it is needed. Forty pieces of snow removal equipment, consisting mostly of rotary plows mounted on trucks go to work while the storm is yet in progress. All equipment is kept going 24 hours a day during an emergency and when relief crews are not available, the men on the machines work through until the job is finished.

Experimental work in adapting the department's present equipment to snow removal problems is carried on each winter, and the State Highway Department estimates that thousands of dollars have been saved as a result of these studies. The economy of the truck-rotary equipment and the transfer of equipment between sections of the State was demonstrated last winter by the fact that the expenditure for snow removal was only \$44,000.

New Appointments at Kron

The Kron Co., Bridgeport, Conn., manufacturer of industrial dial scales, has recently appointed the J. A. Hunt Co., 2036 Sansom St., Philadelphia, Pa., as its district representative in that territory.

Personnel changes at the Bridgeport plant include the appointment of Herman L. Tygesson as General Superintendent and several other additions to the staff have been made because of Kron Co.'s steadily increasing volume of business.

Chicago Dealer Moves

The O. T. Christerson Co., distributor for the Koehring Co. in the Chicago territory, has moved to new quarters located at 3900 South Wabash Avenue, Chicago.



If you're interested in tractor power that gets up on its tracks and moves dirt quickly and at low costs, investigate the FASTER POWER of Allis-Chalmers Oil Tractors. It's Faster Power because A-C design eliminates speed-robbing deadweight—tractor weight saved means extra payload gained ... Faster Power because A-C tractors have more and higher speeds; that means greater flexibility and the right speed for every task. Faster Power because A-C tractors start instantly and go right to work—no fussing with or waiting on auxiliary motors ... finally, Faster Power because A-C tractors are geared to give maximum performance in the higher speeds at which you do 90% of your work. Watch that Faster Power gain extra trips hourly over ordinary, slower-moving tractors.

LOWER IN COST, TOO Not only is A-C tractor power faster, it's Lower-Cost Power, too. The first cost is lower. The operating cost is lower because Allis-Chalmers Controlled Ignition Oil Engines operate on Diesel fuel oils and require no special lubricants. Maintenance cost is lower because Controlled Ignition eliminates the destructive vibration, the high pressures and high temperatures that cut down the normal tractor's life. Compare the performance and cost of FASTER POWER with slower-moving conventional tractors. Ask your nearest A-C dealer for the facts.

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MILWAUKEE, U. S. A.

Controlled Ignition
OIL TRACTORS

Picks and Shovels

(Continued from page 1)

subway and vehicular.

For example, did you know that the first under-river tunnel was constructed under the Euphrates River in Babylon some 2,000 years B.C.? Do you know when, where and by whom the first tunnel shield was used? Did you ever wonder how tunnels were constructed before explosives, compressed air drills and

other modern equipment were available? All this and more is related in an interesting fashion, understandable to the man in the street whose only knowledge of construction is gained by standing fascinated to watch a power shovel methodically fill its bucket in an excavation and deposit its load in a waiting truck. But in addition, the book contains much of interest and value to those concerned with the construction industry, the most important of which, it seemed to me as I read the book, was

a feeling of pride in the perseverance, heroism and accomplishments of those associated with this phase of the construction industry. It is to be hoped that "The Story of Tunnels" (published by Whittlesey House, 330 W. 42nd St., New York City. Price \$2.75) will be widely read, as a first step in educating the public in general in the contributions to progress made by civil engineers and contractors of past and present ages and of this and other countries.

Metallurgical Specialist Opens Consulting Office

John Howe Hall, formerly Technical Assistant to the President of Taylor Wharton Iron & Steel Co., has opened an office as Consulting Engineer and Metallurgist at High Bridge, N.J., specializing not only in foundry work but in the manufacture and application of steels and irons for resisting wear, corrosion and fatigue. Mr. Hall is internationally known as a metallurgist.

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between all wheels, front and rear, right and left. They divide the power so that the wheels with least traction get the least and those with most traction the most power. This super-traction insures a positive drive on all four wheels on slippery ice and snow, muddy roads and rough trails. For heavy snow removal, road construction and maintenance, logging, coal stripping — tough jobs anywhere — you need **WALTER 100% TRACTION**.

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Piles for Overpass On Louisiana Job

(Continued from page 1)

ing plant for the concrete for the test piles, the piles needed for the structure and for the concrete for the superstructure. Aggregate was brought in by gondola cars on a siding and unloaded to stockpiles by an American steam crane. The same crane served the Blaw-Knox batchers and also handled the piles after they were cured. The weights of aggregate and cement for the pile concrete were: 1,228 pounds of gravel, 734 pounds of sand for four sacks of cement with $6\frac{1}{2}$ gallons of water per sack of cement. The Incon cement for the piles was stored in a shed across the siding from the central mixing plant and the sacks raised to the batching platform on skips by the crane. The shed had a capacity of two carloads of cement.

The operating crew for the concrete plant was a crane man, two men on cement and one man for the Ransome 21-S mixer. The mixing time for the pile concrete was $1\frac{1}{2}$ minutes. Water for the concrete as well as for curing the piles and for drinking was furnished by a 2-inch wellpoint jetted to a depth of 145 feet, and pumped by a 2-inch Jaeger centrifugal pump to a 400-gallon closed tank mounted on the bins. A hand pitcher pump attached to the same line furnished drinking water.

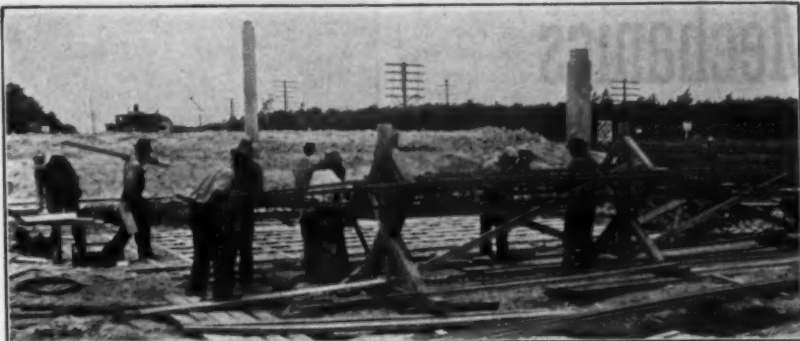
Pile Casting Yard

For casting the 190 piles required for this contract, both test piles and foundation piles, the contractor laid out a well-planned casting yard that permitted the speedy casting of the piles and easy handling for curing and driving. Just south of the central mixing plant and adjacent to the site of the structure, a frame was set up for assembling the reinforcing steel for the piles and a sufficient area set aside for the laying out of the individual forms for the piles.

As the bulk of the piles used in the foundation were 30 feet long it was possible to standardize on form lumber and reinforcing, resulting in great economy. The piles, 16 inches square, tapered to an 8-inch tip in 5 feet and were reinforced with four 1-inch deformed rods and $\frac{1}{4}$ -inch wire in a 6-inch spiral for the full length. The reinforcing was uniformly $2\frac{1}{2}$ inches from the outside of the piles. To strengthen the pile the driving head had four $\frac{7}{8}$ -inch 3 foot 6-inch long rods with $\frac{1}{4}$ -inch wire in a 3-inch spiral. The piles had a $1\frac{1}{2}$ -inch chamfer on all four corners. Four lift bars each $\frac{7}{8}$ -inch in diameter to form two lift points per pile were cast in with the reinforcing.

The form lumber was $\frac{7}{8}$ x 6-inch tongue and groove planed and oiled. In spite of no particular attention being paid to making the piles smooth they presented an excellent appearance when stripped. The 18-inch piles for the two end bents at each end were hand-rubbed as they were exposed. The contractor made good reuse of the tongue and groove form lumber.

The pouring crew and assembly crew working on the piles consisted of: ten men on steel, ten carpenters, four men



C. & E. M. Photo

Assembling the Steel Reinforcing for a Concrete Pile for the New Slidell, La., Highway Overpass

on buggies and four men tamping. All of the labor was green but under the direction of the Superintendent and Foremen quickly became a smooth-running organization. Three of the four concrete buggies used were equipped with pneumatic tires and the results were noticeable. These buggies could carry a larger load with less effort expended

and also when the tires hit a small stone there was no slopping of the concrete so common where metal tires are used.

The piles could be stripped of the side forms 24 hours after pouring and were immediately covered with burlap and kept wet for one week. Ten days after pouring, the piles could be driven as they developed strength very rapidly.

Forms for the superstructure were prepared on the site of the structure, using a small saw rig powered with a LeRoi engine. A half dozen industrial railway cars were equipped by the contractor with hoppers having side chutes for pouring the superstructure. These were hauled from the central mixing plant to a point immediately below the place where pouring was underway and lifted to the deck by the steam crane. The hauling was all done by a Fordson tractor with solid rubber tires running alongside the track.

The pile driver looked a giant among pigmies when handling the 30-foot piles, but it was necessary for the contractor to build a rig large enough to handle the 70-foot test piles and it was uneconomical to discard it and substitute a smaller rig for the actual work. The steam pile driver had 85-foot leads and carried a 70-hp steam boiler for the operation of the 3-drum Lidgerwood hoist for the pile-driving operations and the 2-drum Lidgerwood hoist for moving. A No. 0 Vulcan steam hammer with a 7,500-

(Continued on page 37)

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Practical Soil Mechanics In Earth Dam Construction

Equipment and Tests Used To Determine Design and Methods of Construction of Earth Dams

By E. F. PREECE, Assistant Chief
Engineer, National Park Service

AS THE technical agency supervising the work of the three hundred to four hundred CCC camps engaged in the development of state park areas, the National Park Service has been called upon to direct the design and construction of hundreds of dams for the impounding of water for the dual purpose of recreation and water conservation.

The Act of August 25, 1916, establishing the National Park Service, (39 Stat. 535), states: "The service thus established shall promote and regulate the use of Federal areas known as National parks, monuments, and reservations hereinafter specified by such means and measures as conform to the fundamental purpose of the said parks, monuments, and reservations, which purpose is to conserve the scenery and the natural and historic objects and wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations." (U.S.C., title 16, sec. 1).

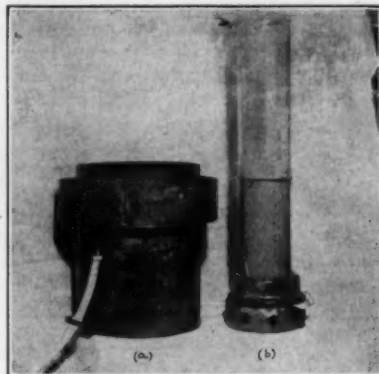
Hence, development other than the minimum necessary to make them reasonably accessible to those who would enjoy them is contrary to the policy and purpose of the National Park Service. Artificial lakes are, therefore, never constructed in National Parks. State park areas, on the other hand, while often located in areas of great scenic interest, must provide for the more active forms of recreation, among which those associated with a body of water are of major importance. It is natural then that an artificial lake should be an early concern in the development program of those state park areas not having that form of recreational facility.

The usual commercial development involves a survey to determine an adequate site followed by the acquisition of the necessary land. The usual park development involves designing and constructing a dam in an area not chosen particularly for that purpose and with a very limited choice of site. It follows from this that the sites are often unfavorable both as to geological characteristics and water supply, and while the dams are not high, rarely exceeding 50 feet, they do present problems in the solution of which the science of soil mechanics is of very material assistance in design and construction.

The equipping of the Engineering Laboratory of the National Park Service,

as well as the establishment of field methods, has proceeded slowly and cautiously. While the principles of the science have been applied here and there to particular problems, only now is it felt that the basic procedure is sufficiently developed to permit general application. The methods given in this article are, therefore, based upon a limited actual application and considerable research, but have been proved practical.

One of the early questions to be answered is that with respect to the system of measurement to use. For many practical reasons the metric system is much simpler to use than the English systems.



The Permeameter for Determining the Coefficient of Permeability of Fairly Porous Soils (Figure 1)

One of the principal advantages is the relation of volume to weight, one cubic centimeter of water weighing one gram at maximum density. On the other hand, practical construction men cannot visualize in metric terms. One ton per

(Continued on next page)

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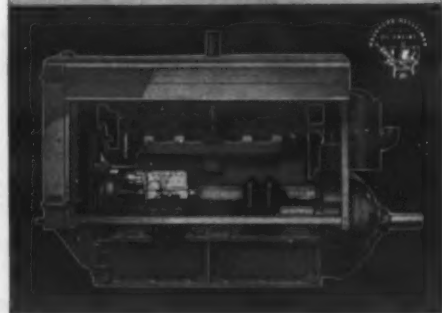
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The Hesselman Engine has a sheave for 13 V-belts on its shaft. Nine of them connect to the driving mechanism of the primary crusher, three drive the generator and one the exciter. A system of chains and sprockets from the primary crusher drives the secondary crusher, return bucket, vibrating screen, conveyor over the screen and washing plant conveyor, from its tail pulley. The rest of the mechanical equipment, except the pump, is motor driven.

This Waukesha-Hesselman Engine is operating on No. 2 fuel oil, burning an average of 9 gal. per hour. A low compression, solid injection oil engine, with precisely timed electric ignition, the Waukesha-Hesselman Engine burns "modern high speed diesel fuels" with high efficiency; yet weighs no more than, and starts as easily as, a gasoline engine. Real horsepower... not paper horsepower. Write for Bulletin No. 1010.

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Soil Mechanics For Earth Dams

(Continued from preceding page)

square foot means something, one kilogram per square centimeter does not, though for practical purposes the two are the same. Hence, while the Engineering Laboratory uses the metric system, those data furnished the field are transposed to English units with the exception of the particle sizes given in the grain size distribution. These are in fractions of millimeters as, for example, 0.002 mm., the upper limit of clay particles.

In general the soil tests made may be classified into two groups according to the use that is made of the information obtained, (a) in the design, and (b) in the construction. In the first group are the tests to determine the coefficient of permeability, the rate of consolidation and the resistance to shear. In the second group are the tests to determine the characteristics of compaction.

Tests for Design

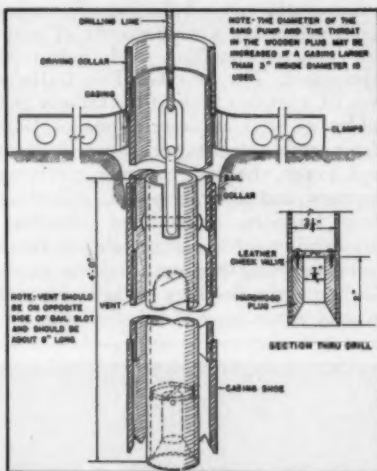
The first step in the investigation includes the examination of the site. Light, portable drill rigs are used, some of which are mounted on a 1½-ton truck and others on skids. Based upon the assumption that it is more satisfactory to have a great many small diameter borings than a few large ones, the drills are equipped to recover a core 3½ inches in diameter. If the formations encountered do not furnish a satisfactory core, and this is often the case in sandy strata, a test pit is put down in a critical location to permit the recovery of proper samples and to furnish a guide in the interpretation of the core borings. In very loose material which cannot be recovered by core barrel methods a sand pump is used. This completely destroys the original structure of the material but by grain size analysis the stratum is correlated with the samples obtained in the test pit. The sand pump is rather slow and it is often supplemented by wash boring. The wash boring is used solely to make quicker progress through the stratum, the samples being taken either by the pump or a barrel. In no case is the wash boring method used as a source of information except that it indicates approximately where a distinct change in strata occurs.

Samples of strata which will remain undisturbed are taken in a thin metal tube approximately 3 inches in diameter and 4 inches long. As soon as taken, about ½ inch is trimmed out at each end and the space filled with melted paraffin. The entire tube is then given a paraffin coat and forwarded to the Engineering Laboratory in Washington. Soil which is to be disturbed, that is, the soil to be used in constructing the embankments, is sampled by ordinary quartering methods to get a representative sample. This is forwarded to the laboratory in ordinary cans such as those used for coffee.

Because of the rapid development of soil mechanics technique and apparatus it has not been considered economical to establish even limited laboratory facilities for each job. As the methods become more fixed and training in the interpretation of test results becomes more widespread the present handicaps will be gradually reduced.

When the samples are received in the Laboratory they are put through a complete series of tests, the first of which is the determination of the grain size. The sieves used are those which most nearly correspond to the actual classification divisions. This grain size distribution is used only to identify the sample and in no way to determine its suitability for use.

In order to use samples within the limits of the core barrels, the apparatus



Details of the Sand Pump Used in Loose Material Where Core Borings are Impossible

for the determination of the consolidation and shear characteristics have been designed to use a sample 2½ inches in

diameter. It is recognized that the use of such small cores may introduce a greater error than the larger-sized cores of approximately 4 inches in diameter. It is felt, however, that the accuracy is within the limits of the assumptions. The data which are derived in these tests are used for the most part by the reviewing staffs rather than by the constructing personnel.

(Continued on page 34)

Portable Service Equipment

A new 4-page bulletin, recently issued by the Homelite Corp., 175 Riverdale Ave., Port Chester, N. Y., describes in detail the complete line of Homelite portable pumps, compressors, blowers and floodlighting units for use in construction service. Full information on styles, sizes and construction details of these easily portable units are given.

ROAD BUILDING EQUIPMENT

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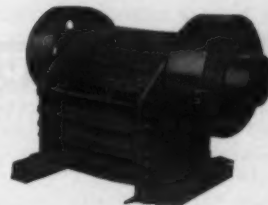
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● Here, in a nutshell, is the story of all-welded excavator construction with alloy steels. At the bottom is an old type carbody . . . it is cast . . . subject to cracking under strain . . . its actual strength is never known. . . Above is the new type P&H carbody, made of tough rolled steels. Every inch of its uniform cross-sectional strength is accurately predetermined. The welds are

actually stronger than the parent metal itself. This new carbody eliminates a good 25% dead weight, reduces ground pressure, costs less to run, less to maintain. The excavator industry will gradually adopt this more practical design. For information on P&H excavators from ¾ to 5 cu. yds. capacity, address the Harnischfeger Corp., 4419 W. National Ave., Milwaukee, Wis.

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EXCAVATORS • ELECTRIC CRANES • ARC WELDERS

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HOISTS • WELDING ELECTRODES • MOTORS

New Pocket Manual On Concrete Curing

A handy size 52-page pocket manual on concrete curing has been prepared by the Columbia Alkali Corporation, Barberton, Ohio, for distribution in all fields using this method of concrete curing. Among the topics included in this manual are a technical discussion of the admixture method of curing, and the surface method of curing with a summary of the Bureau of Standards report on calcium chloride curing and other

pertinent subjects closely connected with this method of improving the strength of concrete. Copies of this manual may be secured direct from Columbia Alkali Corp. without cost by mentioning CONTRACTORS AND ENGINEERS MONTHLY.

Concrete Handling Carts and Equipment

Garlinghouse Brothers, 2416 East 16th St., Los Angeles, Calif., well-known distributor of construction equipment,

has recently entered the manufacturing field, producing a wide variety of modern concrete-handling and industrial equipment. The new Gar-Bro Bulletin No. 51 contains many illustrations and tables as well as descriptions of Gar-Bro portable steel towers, tower buckets and tower sheaves, concrete receiving hoppers and floor hoppers, collection drop hoppers, streamlined wheelbarrows and concrete carts, material dump carts, weighing hoppers, and bin gates. Garlinghouse Brothers will be pleased to send you a copy of this bulletin.

Machining Aluminum

A very interesting and helpful booklet "Machining Aluminum" has been issued in revised form by the Aluminum Co. of America, Pittsburgh, Pa. Many contractors are called upon at one time or another to work with this new construction material. Much valuable information on general machine practice, automatic screw-machine practice and a number of tables containing helpful data are found in this 32-page booklet which will be sent free on request to any readers.

FOUR SIMPLE STEPS



1 The road is scarified for the width of the surface desired.



2 The surface is immediately bladed and rolled to break up the lumps and compact the surface.



3 Standard Asphaltic Road Oil is applied hot with a pressure distributor.



4 In some cases the road is barricaded for a short time to allow the oil to penetrate. Above is a typical Scott County, Iowa, road built up to a fine bituminous mat that may be traveled safely in all weather, the year around.

*Every County
can afford*

THIS METHOD OF
ROAD IMPROVEMENT
with
**STANDARD
ROAD OIL**

● The problem of providing adequate farm-to-market highways on a limited road fund has been solved in many counties by the simple method of road treatment described here.

Like many others, Scott County, Iowa, utilizes the present road material without any additional aggregate. This can be mixed with Standard Asphalt Road Oil on the road.

By providing a method of yearly development this plan eliminates high initial investments and interest payments. Within a few short years, roads so treated develop a heavy bituminous mat that can be maintained with the minimum of expense and *all* at a yearly cost that any county can afford.

A Standard Asphalt representative can give you complete specifications and costs on Standard Road Oil construction. Communicate with the local Standard Oil office or write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago, Illinois.

*Asphalt for
every purpose*

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(INDIANA)



The New Trackson High Shovel for Caterpillar Tractors

A New High Shovel For Tractor Mounting

The new Trackson high shovel, recently announced by the Trackson Co., Milwaukee, Wis., designed for mounting on Caterpillar R4 and D4 tractors, will excavate in clay, gumbo or rocky soil; do stripping, leveling and sub-grading; charge conveyors, crushers and concrete mixers; remove snow and transport or load all kinds of bulky materials, according to the manufacturer. The unit is equipped with a $\frac{3}{4}$ -yard bucket and will dig, move and load up to 50 cubic yards an hour.

The features of the shovel are a fast mechanical hoist unaffected by weather or temperature; an independent front-end drive; free dumping of the bucket at any point of the lift; automatic release when the bucket reaches maximum height; and full visibility for the driver.

The Caterpillar tractors to which this shovel is adapted are specially equipped with wide-gage extra-length rigid track frames of the 5-roller type, front power take-off and blower-type fan.

Literature describing this new Trackson high shovel may be secured by interested contractors, state, county and township highway engineers direct from the manufacturer by mentioning this magazine.

Winter Care of Acetylene Generating Equipment

The oxy-acetylene process frequently involves the use of equipment in which water is essential to the operation, or in which water may be present due to condensation. Therefore, before and during the season of the year when freezing temperatures prevail, such equipment must be given special consideration and care.

The correct winter care of acetylene equipment has three objectives, which were outlined in an article on this subject in a recent issue of *Oxy-Acetylene Tips*: 1. To prevent the possibility of freezing in the first place; 2. If freezing does occur but has not caused any damage, to thaw out the equipment and put it back into service in the safest possible manner; and 3. If the equipment has been damaged by freezing, to handle the situation in such a manner that the trouble can be corrected and the damage repaired in the quickest and safest possible manner.

The principal types of acetylene equipment subject to freezing are generators, floodlights, hydraulic back-pressure valves, regulators and hose. The only completely satisfactory method of protecting acetylene equipment from freezing is to use, store or install the equipment in a room or building in which a temperature of at least 40 degrees F. is maintained. Obviously, how-

ever, this is not always possible. Each such case requires special attention and if any conditions arise which leave any doubt in your minds as to the safe method of procedure, the wisest course is to consult the manufacturer of the equipment, who will be glad to supply special instructions and recommendations and if necessary additional assistance.

This is a matter of vital importance because the freezing of water in acetylene equipment not only disrupts your work but can so damage the equipment that a dangerous air-acetylene mixture is formed. Acetylene when mixed with air in certain proportions is explosive if ignited. In the routine use of acetylene equipment, air-acetylene mixtures are formed but as these are known mixtures, they are handled with safety by following the manufacturers' instructions for the use of the equipment. But the formation of undetected or air-acetylene mixture, the proportions of which are unknown, produces a hazardous condition which may result in a

serious accident. Therefore, it is of the utmost importance that acetylene equipment used during the winter months be properly cared for.

New Line of Compressors With Gas or Diesel Power

The complete Utility line of air compressors now offered by Schramm, Inc., West Chester, Pa., includes sizes of 85, 105, 160, 210, 315 and 420 cubic feet actual air delivery in both gasoline and diesel-engine-driven models. A feature of this new line of compressors is weight savings of as much as 3,500 pounds in the gasoline-powered models and up to 8,000 pounds in the diesel-powered models.

The straight-in-line cylinder construction is used on all models together with force-feed lubrication to all seven main bearings. Other features include electric self-starting on all models, self-aligning clutch between compressor unit and motor, mechanical intake valves, discharge



One of the New Schramm Utility Portable Compressors

valves occupying the entire area of the head, and water-cooled engine and compressor. Special attention has been given to the modern streamlined finish of these compressors.

Complete information on these Utility portable compressors is contained in Bulletin 3700-A-CY, copies of which may be secured direct from the manufacturer by readers of CONTRACTORS AND ENGINEERS MONTHLY.

The NEW BIG STARS of the ROAD SHOW!



SEE THEM IN CLEVELAND JAN. 17-21



The new low-cost concrete pump!

Process—Gloss System—Keeyman

PAVERS **REX** PUMPCRETE
CHAIN BELT COMPANY of MILWAUKEE

Silicosis Hazard in Blasting Operations

(Continued from page 2)

especially the lungs, and makes them much more easily and readily susceptible to harm from the breathing of dust particles.

Safeguards Against Hazard

Past blasting practice most certainly must be modified and reformed if contractors are to avoid heavy penalties in compensation and other charges due to the inclusion of legislation on occupational diseases in the laws of the various states. If at all feasible, blasting should be done at the end of the working shift or on an off-shift, and the dust and gas-laden air should be removed or thoroughly diluted before the men return to work.

Ventilation is, of course, an essential agency in cleansing the air where blasting has been done but, in addition to ventilating the place, it should be thoroughly wetted, including walls, floors, top, timbers, etc., before blasting, and a water blast should be kept in effect during and after blasting. The region should be thoroughly wetted upon the return to the face region and the muck pile should be kept wet at all times while loading it, as the water not only tends to allay the dust but also absorbs or otherwise aids in the dilution or elimination of harmful or poisonous gases which usually cling to the blasted material.

In general the larger the quantity of explosive used, the more finely divided the blasted material, the more heavily the air is impregnated with dust and smoke, and the greater the quantity of poisonous gases left at the site of the work. Hence, methods should be used which will tend to reduce the quantity of explosives used and of gases and dust produced. In this it will be found that the use of stemming or of some type of blasting plugs now available will more definitely confine the explosive. Hence, it will increase its efficiency and reduce the quantity of explosive required and also reduce the amount of poisonous gas produced and possibly reduce the violence of the blast and its tendency to produce dust and disseminate it into the air at the tunnel head.

And it would be well for the users of explosives to investigate types of explosives that are known to give off minimum quantities of harmful gases on detonation and to use them; also the elimination of the use of fuse and the substitution of electric blasting aids in reducing the amount of poisonous gases from blasting. Explosives that have been held in storage too long or that have been stored under unfavorable moisture and temperature conditions are likely to give off maximum quantities of harmful gases if they detonate at all; hence utmost care should be taken in the storage of explosives to see that they are not held too long before being used.

Employers' Responsibility

Prevention of dust disease is chiefly

an employer responsibility which he should shoulder willingly, not only to safeguard the health of his employees but also to relieve his firm of the heavy financial burden likely to be thrust upon it by compensation and legal authorities, should employees become afflicted with dust diseases. This does not mean that the employee should not help himself as it is manifestly as much to his interest to avoid dust or any other occupational disease as to avoid accidents. However, information in understandable form on occupational diseases such as silicosis is not readily available to the worker and the employer should carry on an educational campaign to inform his superintendents and foremen about occupational diseases and have them transmit to the workers sufficient information about them so that the workers can cooperate wholeheartedly in trying to eradicate these dread diseases or at least control them to a far greater extent than has been done.

From a paper presented before the Twenty-Sixth National Safety Congress.

A New ¾-Yard Shovel

The new Model 303 ¾-yard shovel, recently announced by the Koehring Co., 3026 W. Concordia Ave., Milwaukee, Wis., is a high-speed light-weight machine, in which the use of high-strength special steels combined with welded construction and simplified design has resulted in rugged strength with a substantial decrease in weight.

The 303 is fully convertible, with a 1-yard rating as a crane or dragline. Attachment changes are easily and quickly made on the job. Many Koehring features are incorporated in this new machine, including easy operation. A simple gear shift provides two selective swing speeds and two traction speeds give power in tough going and speed in light traveling. Positive steering for any angle is easily accomplished from the lever position in the cab, which is equipped with safety glass and provides full visibility for the operator.

Convenient and free accessibility of

all parts is a time-saver when adjustments are necessary. Each shaft can be independently removed. The drums are equipped with quickly removable barrels. The gears are enclosed and run in an oil bath and anti-friction bearings are provided to eliminate power waste.



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WI POWER A DRAGLIN

Preventive Measures Against Silicosis

(Continued from page 2)

which is based largely on the work of the Public Health Service, of 10,000,000 particles of dust per cubic foot. This is a convenient target to shoot at when dust control measures are undertaken. That is not to say, however, that a threshold of 10,000,000 particles of a highly siliceous dust is safe. This standard was based on exposure to granite dust, containing about 35 per cent pure silica.

Tunnel Construction

The mention of close and confined places brings to mind tunnels, about which there has recently been much agitation. Without going into details concerning this subject, the lesson to be learned is clear. The digging of a tunnel is not a permanent undertaking in any locality but the work should be safe-guarded as in more permanently established industries. Where a tunnel is being constructed in a highly siliceous rock, the dust hazard looms very large. It is similar to hard-rock mining and everything conspires to make the control of dust difficult. It is interesting to note that tunnel work in various parts of the world has been followed by similar experiences.

The report of the Director General of Public Health for New South Wales in Australia, 1924, details an investigation concerning ventilation and sandstone dust present in the air of certain sewer tunnels in Sidney. Apparently there was an excessive amount of silicosis and tuberculosis among these tunnel workers.

A report of the South African Institute for Medical Research, April, 1935, details a severe silicosis hazard among sewer tunnel workers in a city in South Africa.

We are justified in concluding that tunnel work calls for extraordinary precautions for safety and health with a supervision of the health of tunnel workers comparable to that followed in other industries. Grinding or pulverizing sand, gravel, and other highly siliceous materials are processes that need very careful control and supervision.

Control of Dust

The control of the dust hazard is an engineering problem and in the main depends on an effort to entrap the dust at its point of origin by using water, or suction exhaust systems, or both. Once the dust is in the air, reliance is placed upon further use of water, and on dilution of the silica dust by increased ven-

tilation and on protecting the individual by a suitable mask or respirator. The United States Bureau of Mines now certifies respirators that are safe for silica dust. The use of respirators should be restricted to exposures which are intermittent or temporary.

Where ventilation equipment designed to remove dust from the air is installed, its efficiency should be checked from time to time by dust counts, using the standard impinger method. As with other protective devices, there is always danger that this sort of apparatus becomes greatly impaired or useless because of failure to maintain it properly.

Care of Employee

A matter of great concern to the employer is what disposition to make of cases of silicosis among his employees. If active tuberculosis is present, it is to the interest of the individual and his fellow workmen that he be removed from his occupation and given proper care. If infection is not present, there will be little or no disability and the

employer should protect the individual from further exposure through methods suitable to the situation involved.

The important item to remember is the nature of the material and the process in which it is employed. Consideration of these two items will enable the employer to ascertain whether a silica hazard is present and to act accordingly. Again let me emphasize that where workmen are exposed to a highly siliceous dust in confined places, the situation is extremely serious and calls for energetic and comprehensive measures of control and continued medical supervision of the men. Dust samples should be taken frequently and the men should be examined frequently so that serious disease will not occur.

From a paper presented before the Twenty-Fifth Annual National Safety Congress.

New Ransome Dealer

The Western Steel & Equipment Corp., 734 N. E. 55th St., Portland, Ore., has just been appointed representative

in the Oregon territory for the entire line of concrete mixing and handling equipment made by the Ransome Concrete Machinery Co., Dunellen, N.J.

New Pressure-Pipe Booklet

The story of asbestos-cement pipe from its development over 25 years ago to the present day, with more than 23,000 miles of this pipe in service throughout the world, is told in a new illustrated booklet recently issued by Johns-Manville. The manufacture of asbestos-cement Transite pipe, the tests to which it is subjected before release for shipment, ways by which to lower installation, operating and maintenance costs and other interesting and valuable data are also discussed.

Copies of this booklet "Transite Pressure Pipe," Form TR-11A, may be secured by interested contractors and engineers direct from Johns-Manville, 22 East 40th St., New York City, by mentioning this magazine.



PAVING THE ROAD To Economy

Prevention of future avoidable maintenance costs was one of the objectives of highway engineers who specified Truscon Steel Products for the new road illustrated. An equally important objective will be accomplished when future savings in road maintenance costs will be made available for replacement of additional miles of obsolete roads in the state. • Permanent, wear-resisting, non-skid road surfaces are obtained with Truscon welded steel fabric. Truscon steel road forms with sliding connections provide perfect alignment . . . are

easy to install . . . and contribute to road durability. • Truscon expansion joints and contraction plates absorb stresses in concrete bases and provide straight, uniform cracks when the concrete expands or contracts. Truscon rolled steel bars, curb bars, edge protectors and auxiliary equipment contribute to "paving the road to economy." For complete details, write Truscon Steel Company, Youngstown, Ohio, or communicate with the nearest of Truscon's 57 Sales-Engineering Offices.

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POWER ARM, POWER WHEEL, MULTIPLE-ROPE,
DRAGLINE . . . *buckets*

Soil Mechanics For Earth Dams

(Continued from page 29)

Test for Construction

The one test which seems to have an application to the construction procedure is that presented by R. R. Proctor for determining optimum moisture content. There are a great many different opinions with regard to the methods both of making the tests and of applying the results to the job, but basically they are the same. For the laboratory penetration test a device designed by C. A. Hogentogler, Jr., is used. (This device is described in the *Proceedings of the Highway Research Board, 1936*, by its designer.) In the Engineering Laboratory of the National Park Service the Proctor compaction hammer has been redesigned for use in the press rather than by dropping it through a prescribed distance, which is the usual method. Moreover, the compaction is performed in two ways: first, in the equivalent of Proctor's 25 blows on each of three layers; and second, as nearly parallel to the actual field compaction as possible. The results of the first, together with the penetration resistance, is filed in the laboratory for future reference; the results of the second are used for the construction control. The method has not been in use long enough to establish a basis for the extent of compaction to be obtained in the second manner. For the time being 12 strokes of the piston loaded to the same weight per square foot as the sheepsfoot roller is used on a 6-inch depth of material. The compacted weight per cubic foot of the actual sample at optimum moisture content is the criterion for the actual job.

It will, no doubt, be argued that this is a rather crude method lacking in the refinements possible by the use of the penetration needle. This is, of course, a matter of opinion. It has, however, been tentatively adopted for reasons which, in the light of present day knowledge, appear to be logical. In the first place, the purpose of compaction is to obtain a maximum density of the material, which really is a question of getting the most soil particles possible into a given volume. Since the results obtained by the penetration needle cannot yet be used quantitatively, they furnish only an indication that maximum compaction has been obtained. Since, as has been stated above, maximum density is a condition of a maximum volume of particles in a unit volume of soil, it may also be expressed as a weight per unit volume. It must be noted that the weight used is the dry soil plus the moisture and not just the dry soil alone which is the term usually used in the Proctor method. It is the experience of most users of the Proctor needles that there is a considerable personal element in their use. If, on the other hand, a uniform cylinder is used to obtain a sample for weighing, there can be little, if any, difference in the results obtained. A steelyard may be used for weighing the sample and, if the core cylinders are reasonably identical, the arm of the steelyard may be graduated to read direct in terms of pounds per cubic foot.

Too little is yet known about the effect of chemical composition on the compactibility of a soil. That there is a difference due to such a cause seems certain. Whether or not the degree of the effect will justify consideration of this factor can be determined only by additional study. Determination of the pH value of all soils is a part of the routine tests made in the Engineering Laboratory but as yet no attempt has been made to apply the information even

qualitatively in the selection of soils.

Permeability Tests

In general, the flow of water through an earth dam does not lend itself to mathematical solution. Even by the careful methods used in the laboratory it is impossible to construct a truly homogeneous structure, and in the field it is utterly impossible. Moreover, the usual structure is made additionally complex by the use of elements of different degrees of permeability such as cores, more or less porous downstream embankments, drains, etc. A series of tests is now being made in the model flume, and while the series is not yet complete, there are certain conclusions which appear to be sufficiently substantiated to permit their statement at this time. One of the most important of these is that there are two types of flow within a dam and in the ground immediately downstream from it, (1) a pressure flow and (2) a simple gravitational flow. The transition from the first to the second may occur anywhere with-

in the dam, depending on the flow-retarding elements of the dam. If a drain enters an area in which the flow is under pressure, the volume of percolating flow will be increased; if it enters an area of simple flow the volume of flow through the dam as a whole will not be

increased. Hence, drains serve a useful purpose in the latter case but may introduce a weakness in the former case. It is pointed out that a poorly compacted layer in a dam acts exactly as a drain and tends to reduce the effective width
(Continued on next page)

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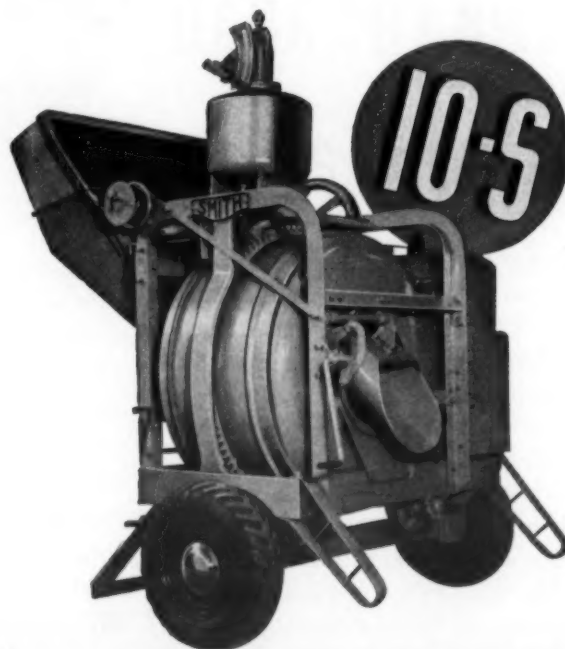
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SMITH MIXERS

THE BOULDER DAM MIXERS

Soil Mechanics For Earth Dams

(Continued from preceding page)

of the dam in the same way.

Figure 1, a and b, illustrates the permeameter for use in determining the coefficient of permeability of fairly porous soils. Figure 1a is the base tank and was made from a piece of 8-inch stove pipe. The trough around the outside is merely to collect the overflow and may be omitted.

Figure 1b is a glass tube set in a wooden base. The lower section of the base is to permit free flow of water through the sample. The glass cylinder extends to the top of the lower wood section where a screen supports the material in the cylinder. This cylinder is placed in the tank and the water permitted to flow upward in order thoroughly to saturate the sample and drive out the void air. The cylinder is then filled from the top and permitted to percolate through the sample, the base tank maintaining a constant tail-water level. Provided the cylinder containing the sample is of uniform area throughout its entire length, the coefficient of permeability in inches per minute may be determined from the following:

$$k = \frac{L}{t} 2.3 \log \frac{H_1}{H_2}$$

where L is the length of the sample, H_1 the distance in inches from the elevation of the water in the cylinder at the beginning of the test to the overflow of the base tank, H_2 the distance in inches from the elevation of the water in the cylinder to the overflow of the tank at the end of the test, and t is the time in minutes for the water to drop from H_1 to H_2 . If the cylinder is marked for the water elevation at the beginning of the test and also at the end of the test so that H_1 and H_2 are always the same, the foregoing formula may be simplified by computing the constant value of $2.3 \log H_1/H_2$, and call this R. The formula may then be written $k = \frac{L}{t} R$

If the soil to be tested is relatively dense so that the fall of the water in the cylinder is very slow, caution should be exercised to avoid error through evaporation. It should be noted that the area of the cylinder does not enter the formula, therefore, any diameter tube may be used. The cylinder may, of course, be metal rather than glass. The former will be easier to obtain and has one distinct advantage in that it may be forced into the ground to obtain the sample with less danger of breakage. Measurement of H_1 and H_2 are not so easy as with glass, but a little ingenuity will overcome this disadvantage.

Soil Mechanics Still Empirical

It seems certain that further development of the technique of soils mechanics will permit certain workable generalizations in the application to small structures. At present it does not appear that

simplification is either possible or advisable. A little knowledge will prove dangerous to the user and certainly no advantage to the development of the science. That careful and thorough study of the literature available will pay dividends to any one constructing heavy fills for dams, highways, etc., seems too obvious to require proof. It might be well to give warning that much of that literature will be extremely complicated and, undoubtedly, difficult for those who have permitted their facility with the theory of elasticity, mechanics and higher mathematics to become rusty. Even without these aids, however, enough meat may be obtained from the mass to make the effort worth while. Here, apparently, is a tool of many uses. The best manner of using the tool is still generally unknown. Carefully used, positive accomplishment can be attained even by the beginner. On the other hand, it would be better not to use it at all if it is not to be used carefully.

A. R. B. A. JAN. 17-21.

Magnetic Control For Arc Welders

A new line of simplified arc welders, redesigned to operate magnetically instead of manually, has been announced by Hobart Bros. Co., Troy, Ohio. These welders provide complete over-load and under-voltage protection. When the welding load is such as to require the full rated horsepower the operator flips a small toggle switch to the "high" position and presses the starter button. The motor then starts under reduced voltage with about one-third the starting current usually drawn when starting across the line. As soon as the machine comes up to speed, the switch automatically changes over to the normal, full-load running position.

If one-half the rated horsepower of the machine is sufficient for the job at hand, the operator flips the toggle switch to the "low" position. In this case, when the starter button is pressed, the machine starts and runs without changing over to the full-load position.

The manufacturer claims that this arrangement is equivalent to supplying two motors and saves from 30 to 50 per cent on current costs.

Gustafson Appointed P.C.A. Asst. Dist. Engr.

E. N. Gustafson, a practicing civil engineer in the southwest for more than 25 years and for the past 2 years a member of the engineering staff of the Portland Cement Association, has been appointed Assistant District Engineer of the Association with headquarters in Austin, Texas. Mr. Gustafson, who has had considerable experience in irrigation, conservation and flood control work as well as having been in charge of numerous highway construction projects as Resident and Division Engineer for the Texas State Highway Department, will generally assist in the activities of the Association in the Texas territory, of which C. A. Clark, District Engineer, is in charge.

Good Engineering and Good Products Make Good Roads



Socony Binder C, Bituminous Macadam, Standard Brand, on Route 202, Massachusetts.

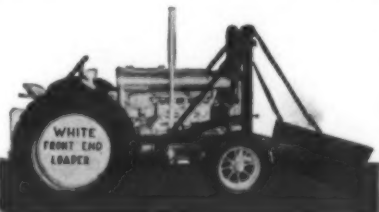
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Engineer's Viewpoint On Highway Safety

(Continued from page 7)

chemicals are placed on hills and curves to relieve slippery conditions.

In the matter of guiding and handling traffic, we have placed traffic-control lights at important intersections, flashing lights at railroad crossings, and warning and information signs along all state highways. These signs have been standardized so as to simplify them and make them readily recognized by motorists. A large number of these signs have been equipped with reflectors to make them more effective at night. Reflector buttons have been placed on bridge ends and other obstructions within the shoulder area. Speed limits established by the Legislature have been marked and some experimental sections of highway lighting have been installed.

Things Yet To Be Done

There are a number of things which, in my opinion, we still need to do to increase safety on our highways. First, we must become safety-conscious, recognize its place among the important problems, and get really to work at the job of safety. We need more complete reports of accidents and have engineering studies made of them to see what, if any, engineering means can be used to correct the conditions.

We need to construct and maintain our highways so as to provide a free flow of traffic at a reasonable speed, to keep the driver in a calm state of mind and not to surprise or frighten him. Most accidents happen when a driver is in a highly emotional state, usually of fear. Therefore, I believe that anything that can be done to keep surprise from the highway and the resulting emotion from the driver is certainly a safety device.

From a paper presented before the Twenty-Third Annual Purdue Road School.

New 4-Yard Scraper

The new Junior Continental 4-yard wagon scraper, recently announced by the Continental Roll & Steel Foundry Co., Tractor Equipment Division, Railroad Ave., East Chicago, Ind., is similar in general design and operation to the larger models but is intended for use with smaller tractors of 35 to 50 hp. Although this new 4-yard model is smaller and lighter in weight, the manufacturer claims that the necessary ruggedness to dig, load and haul capacity loads of tough clay, rock, tree-root-imbedded soil, shale, hardpan, etc., has not been sacrificed.

Other features of the Junior model are high axle clearance, a large fast-dumping rear gate, the new Continental BE-GE hydraulic power control unit with adaptors for all tractors of 35 to 50 hp, shorter overall length for easy turning, and a wide cutting blade, the width of cut being the same as that of the 5-yard size.

The new Junior Continental, Model CS4A, is completely described and illustrated in Bulletin No. 107, copies of which may be secured direct from the manufacturer by those interested by mentioning CONTRACTORS AND ENGINEERS MONTHLY.



The New Junior Continental 4-Yard Wagon Scraper



The New Model 99S Hug Truck

A New 12-Yard Truck

An addition to its line of Roadbuilder trucks, the Model 99S, has just been announced by the Hug Co., 716 Cypress St., Highland, Ill. This quarry model is available with gas or diesel power, has a maximum payload capacity of 40,000 to 44,000 pounds and is designed for power hoist bodies up to 12-yard capacities.

The standard engine is a Buda GF-638 gasoline unit or a Cummins HB-6 diesel. Transmissions include a four-speed unit and three-speed auxiliary, giving a total of twelve speeds forward and three reverse. The rear axle is of the double

reduction dual-drive type, equipped with equalizing beams and torque rods to distribute the load properly over both axles and keep them in the same parallel plane.

Standard equipment includes an all-welded Hug steel cab and the unit is offered with various types of side and rear-dumping bodies and hoists. The tires are 12.75 x 20, single in front and dual in the rear, and air brakes on all wheels are standard.

New Model Air Compressor

A new model 105-cubic foot side-by-side trailer compressor has just been added to the line of compressors made by the Davey Compressor Co., Inc., Kent, Ohio. Compactness is the feature of this unit which is 62 inches high, 65 inches wide and 114 inches long.

The unit is especially adapted for use where a high degree of portability is required and can be towed behind a car. Pneumatic tires are standard



The New Davey Side-by-Side Trailer Compressor

equipment. It is available in either single or two-stage design.

Why must we have enough memory to recall the tiniest detail about what has happened to us and not have enough to remember how many times we have told it to the same person?

—La Rochefoucauld.

KOEHRING *heavy duty*

PAVER MIXER SHOVEL

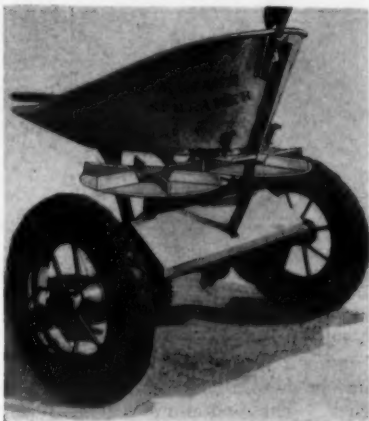
at the **ROAD**

Presenting
The New 34-E Dual-Drum Paver . . . the latest contribution by Koehring to highway paving progress.

Two-Wheeled Spreader For Sand and Cinders

A sand and cinder spreader which is small in size and easily attached to the rear axle or frame of a motor truck is produced by the Portable Elevator Mfg. Co., Bloomington, Ill. The Little Giant spreader is carried on steel wheels with low pressure tires having a heavy tractor tread to provide ample traction to operate the simple mechanism which drives the spreading discs or spinners. These are 18 inches in diameter and each spreader is equipped with two discs for greater width of spread and more flexibility.

Above the spinners is a hopper 36 inches wide, 30 inches long and 18 inches deep of galvanized steel. Into this hopper, men on the truck hand-shovel the material being spread. All gearing is covered by a canopy-type steel shield protecting it from falling material. The unit is fitted with Zerk pressure-gun lubrication nipples and the chassis bear-



The Little Giant Spreader

ings have Chrysler-Amplex Oil-lite sleeves.

There are two feed openings in the hopper bottom, one over each spinner with two-section slides to cover each opening. One section of the slide ad-

justs for the kind of material to be spread while the other takes care of the quantity of material. Both the density of coverage and the width of the spread, which varies from 8 to 25 feet, can be regulated. Both wheels drive the main axle through ratchet clutches which may be disengaged so that the wheels revolve free and the mechanism does not function when trailing the truck from job to job.

New Manager of Compressor Div. at Sullivan Machy. Co.

Alexander W. Limont, Jr., who has been associated with the E. I. du Pont de Nemours organization for the past 9 years, has been appointed Manager of the Compressor Division of the Sullivan Machinery Co. at Michigan City, Ind. Mr. Limont has had considerable experience in compressor problems, having previously been associated with the Norwalk Iron Works and with Ingersoll-Rand.

Pile Casting for Louisiana Contract

(Continued from page 27)

pound ram drove all the piles.

Major Quantities

The major quantities on which the contractors were required to bid were as follows:

| Item | Quantity |
|-------------------------------------------|--------------------|
| Roadway excavation..... | 68 cubic yards |
| Concrete pavement, Type B..... | 2,036 square yards |
| Borrow..... | 28,497 cubic yards |
| 24-inch concrete pipe..... | 66 linear feet |
| Class AA concrete..... | 895 cubic yards |
| Class A concrete..... | 662 cubic yards |
| Deformed reinforcing steel..... | 314,664 pounds |
| Fabricated structural steel..... | 252,789 pounds |
| 14-inch piles..... | 566 feet |
| 16-inch piles..... | 3,680 feet |
| 18-inch piles..... | 5,570 feet |
| Unloaded test piles..... | 11 piles |
| Combination concrete curb and gutter..... | 543 feet |
| Structural excavation..... | 431 cubic yards |
| Removing concrete pavement..... | 814 square yards |
| Bar reinforcement..... | 12,095 pounds |
| Asphalt filler, expansion joints..... | 0.10 tons |
| Loading concrete piles..... | 11 piles |

After the test piles had been driven and the required number loaded the actual number and sizes of piles to be used was changed from the figures on which the contract was bid. The changes were as follows:

Permanent Foundation Piles

| | | | |
|-------------|--------------|------------|--------------|
| Bent 1 | 6 piles | 18" square | 55 feet long |
| Bent 2 | 5 piles | 18" square | 55 feet long |
| Bents 3-11 | 8 piles each | 16" square | 30 feet long |
| Bent 12 | 13 piles | 16" square | 30 feet long |
| Bents 13-21 | 8 piles each | 16" square | 30 feet long |
| Bent 22 | 5 piles | 18" square | 55 feet long |
| Bent 23 | 6 piles | 18" square | 55 feet long |

Personnel

The overpass contract at Slidell, La., WPGH 76E, State 6112, was awarded to W. Horace Williams Co., Inc., of New Orleans, La., for \$120,690.65. Work was started early in March, 1937, and the contract completed well within the 250 working days allowed. Whit Downs was Superintendent for the contractor and W. E. Wakefield was Resident Engineer for the Louisiana Highway Commission.

A New Drilling Machine

The new Speed Star drilling machine No. 71, recently announced by the Star Drilling Machine Co., Akron, Ohio, is designed for drilling water wells, blast holes and similar work. It is an all-steel portable light-weight durable outfit.

The No. 71 will handle 1,600 pounds of tools to a depth of 600 feet. It has ample spooling capacity for all operations, both new drilling and cleaning out, according to the manufacturer. The bull reel will spool 1,500 feet of $\frac{3}{8}$ -inch line on the working side and 1,000 feet on the storage side. For shallow drilling, 500 feet or less, the manufacturer recommends equipping the bull reel with a center drum. This center drum shortens the working side of the reel, permits faster pulling of the tools, and protects the pipe drum from line wear. It is built in halves for quick attachment or removal and is furnished with a lock-type line guard for the front spudding sheave.

For drilling deeper than 500 feet, the center drum and line guard are quickly removed, increasing the working-side capacity of the reel and leaving the front spudding sheave free to travel on the shaft. Power is furnished by a 4-cylinder gasoline engine, mounted on an adjustable base for easy adjustment of the V-belt tension, and rests on rubber mountings to reduce vibration. The take-off is direct, without reduction gear or clutch, and is equipped with an SKF ball bearing. The telescoping mast is 33 feet high when fully extended and telescopes down to 22 feet when down for moving. The top braces stay connected in either raising or lowering.

The No. 71 Speed Star, which is available in several trailer models with steel or rubber-tired wheels in addition to a truck model, is fully described in literature which may be secured direct from the manufacturer by mentioning this magazine.

CONSTRUCTION EQUIPMENT *on parade*



SHOW and CONVENTION

CLEVELAND
Jan. 17-21, Space No. A-25

See the new
KOEHRING
34-E Dual Drum Paver
Longitudinal Finisher
Shovels • Dumptor
Trail-Dump • Mixers

KOEHRING COMPANY • 3026 W. CONCORDIA AVE • MILWAUKEE, WIS.

Storage Reservoir For Little Rock

(Continued from page 20)

in 4 and 8-inch layers with a maximum 6-inch stone permitted.

To secure the water required for the sprinkling of the embankment, the contractor installed a 4-inch Rex centrifugal pump at the filter plant and pumped city water back through the completed section of Lock Joint pipe to the site of the dam where the pipe was bulkheaded. This maintained sufficient pressure in the $3\frac{1}{2}$ miles of pipe line so that the 1,000-gallon tank mounted on a Ford V-8 truck could be filled quickly. The water was hauled out onto the dam and the earth wet by streams from a 4-inch header at the back of the truck. The embankment was maintained close to the required moisture content but in spite of every effort to control the application, the sheepfoot rollers were sometimes filled completely with sticky mud, requiring stopping and backing to clear them. Tests of the earth several feet below the surface of the embankment showed the correct amount of moisture at all times.

In case of emergency or the taking of the pipe line out of service for testing so that the contractor could not use it for his water supply, he impounded rain water to a shallow depth behind the dam and installed a 3-inch Jaeger Sure-Prime pump for filling the sprinkling truck.

Another flat bed Ford truck with a crew of three men was used for gathering all roots and oversize rock from the surface of the dam and hauling to a convenient dump.

Working two 6-hour shifts a day the contractor delivered 2,500 yards of pay dirt to the dam daily. The dam was built with a 2 to 1 downstream slope and $2\frac{1}{2}$ to 1 upstream slope. The upstream face of the dam between high and low water is to be covered with hand-placed riprap and the downstream face will be sodded.

Personnel

Contract No. 6, the Emergency Reservoir, was awarded to S. E. Evans of Fort Smith, Ark., on his bid of \$96,611.85. Cavett Pettigrew was Superintendent for the contractor. The work for the entire project was in charge of Burns and McDonnell of Kansas City, Mo., consulting engineers for the City of Little Rock, Ark. M. L. Crist was Resident Engineer for the engineers with M. H. Walser and Robert W. Burns as Engineers in charge of engineering work and soil studies for Contract No. 6.

New Earth-Boring Machines

Two new earth-boring machines mounted on FWD Model SSU four-wheel-drive trucks, delivered recently to an eastern railroad for heavy-duty work in its construction program, are equally adaptable to other types of construction jobs where earth boring in terrain too steep and rough for ordinary trucks is required.



An Earth Boring Machine on an FWD Truck Being Set for Action



C. & E. M. Photo
Cable and Hydraulic-Controlled Scrapers Teamed to Haul and Spread Material For the Dam of the Emergency Reservoir at Little Rock, Ark.

With a tower 18 feet high and an auger shaft 20 feet long, these machines are reported to be the largest of their kind ever built. Furnished with both 30 and 36-inch augers, the machines can dig 14-foot holes in a fraction of the time usually required by manual labor. The huge digging tower is raised by two large coil springs of anti-gravity type. The boring machine mechanism is mounted on a turntable, so that holes

may be dug on either side or behind the truck. The operator's seat is located on the side of the boring machine frame and beside the digging mechanism, placing the operator in full view of the digging operation.

A standard A T & T winch, a capstan, and a collapsible power reel are among the standard accessories. The truck also carries a full complement of direction lights, a large spotlight on the boring

machine platform and a standard spotlight on the truck cab.

Complete information on these earth-boring units may be secured direct from the Four Wheel Drive Auto Co., Clintonville, Wis., by mentioning this magazine.

How to Select Wrenches

The selection and use of wrenches, depending upon the type of work to be done, is discussed in an interesting and informative little booklet recently issued by J. H. Williams & Co., 75 Spring St., New York City, manufacturer of 50 patterns and over 1,000 sizes of wrenches. Helpful information to guide the mechanic and tool buyer as well as complete tables giving the correct wrench openings for U.S., S.A.E., American Standard nut and cap screw sizes are included.

Copies of this booklet may be secured without obligation by writing direct to the company and mentioning this magazine.

DON'T MISS THE



THERE'LL BE OVER 400 EXHIBITS OF 1938 NEW *Contracting Equipment, Methods and Materials*

AT THE A. R. B. A.

5-STAR ROAD SHOW AND CONVENTION CLEVELAND—JANUARY 17-21

New Tractor Designed With All-Rubber Track

A new tractor of the track-laying type has been announced by the Marmon-Herrington Co., Indianapolis, Ind. The road speeds of this new tractor are reported to be 25 miles an hour and better, with a consumption of one gallon of gasoline for 4 to 5 miles of road travel.

The new tractor utilizes the new Goodrich type of rubber track with Marmon-Herrington patented suspension. The special track is a continuous band of rubber, smooth on the inner surface and with traction lugs on the outer surface. This band does not stretch or lose its shape because of a core of from 20 to 30 endless, flexible wire steel cables gripped at intervals by the track guide and drive lugs. The drive sprockets impart power directly to the cables and the rubber is used only as a cushioning medium and not to transmit power.



The New Marmon-Herrington Crawler Tractor with Rubber Treads

The new type of steering clutches are fully air-cooled and operated mechanically with an auxiliary booster system. The tractor can be pivot-turned either from a standing position or from the highest forward speed. The manufacturer states that its center of gravity is so low that the unit can be turned on the face of any hill it will climb and that while it may slip sideways it

does not turn over. The special welded steel hull is watertight, allowing operation in more than 36 inches of water without danger of stalling.

Arrangements are being made to adapt this tractor for use with road construction equipment and for snow plowing.

Wheeled Roller Taken Over By Littleford Bros.

The Wheeled Roller, originated and developed by the Wheeled Roller Corp., San Antonio, Texas, will be manufactured and sold exclusively by Littleford Bros., 485 E. Pearl St., Cincinnati, Ohio, beginning January 1, 1938.

Since the introduction of the Motorized Wheeled Roller there has been a definite need for a geographically central point of manufacture to facilitate deliveries. The unit will continue to be known by its present name but important improvements in the mechanical design are being engineered by Littleford Bros.



The New Knickerbocker Tub-Type Concrete Mixer

Tub-Type Concrete Mixer

A new 3½-cubic foot concrete mixer, embodying several features usually found only in mixers of larger capacities, has recently been announced by the Knickerbocker Co., Jackson, Mich.

The mixing drum of this new trailer mixer, which is of the tub type, is built for long hard usage. To the one-piece cast semi-steel drum bottom is riveted a 6-inch heavy steel band to which is riveted the drum cone, reinforced around the top with a steel tire. Four mixing blades are designed continually to throw the material back for remixing. The drum shaft is 20 inches long, revolves with the drum, is held in position by a large nut and has two long bronze bearings, one at the top and one at the bottom of the yoke. The total bearing area is 5 inches, with a large lubricant chamber between the two bearings. A Timken thrust bearing takes up the thrust of the loaded drum and is completely sealed from water and grit. All bearings have Dot lubrication. The unit is furnished with gasoline engine or electric motor, and with steel, cushion rubber or pneumatic tires.

Complete information on this new Knickerbocker trailer-mixer may be secured direct from the manufacturer.

New Belt Conveyor Carrier For Pipe Frame Mounting

A new light-weight ball-bearing belt conveyor carrier, recently announced by the Stephens-Adamson Mfg. Co., of Aurora, Ill., has a rigid truss-type frame supported on two parallel pipes instead of the conventional structural steel or timber stringers. The carrier brackets are clamped to the pipes without boring holes and the carriers can be shifted whenever necessary.

By using standard 2-inch pipe, a light but sturdy conveyor frame can be assembled quickly and inexpensively from materials obtainable anywhere. A rocker-type of mounting permits the carrier to tilt in either direction with the travel of the belt. In this way, even a reversible direction belt is centered on the carriers without the use of guide rollers. Permanently sealed Fafnir cartridge-type ball bearings are used to increase bearing life and reduce maintenance costs.

These carriers are furnished in two styles, one consisting of the carrier only and the other including both carrier and return roller in one light easy-to-mount assembly. Special ball-bearing head, take-up and countershaft pillow blocks are available and can be mounted on the same frame which supports the carriers.

Ackerman Joins Dravo Contracting Division

A. J. Ackerman, who for the past four years has been the head construction plant engineer for the Tennessee Valley Authority, has been appointed Development Engineer for the Engineering Works Division and the Contracting Division of the Dravo Corp., of Pittsburgh, Pa.

GREATEST SHOW ON EARTH!



Get in on the ground floor in 1938 by being among those present when the nation's leading road-building and contracting authorities gather to discuss what's new in construction methods, materials and equipment.

See in advance the new 1938 pavers, tractors, pumps, mixers, excavators, compressors and all other machines

that will be shown to the road-building world for the first time.

Yes, sir, he's right—this *will be* the greatest show on earth—where every minute spent will pay dividends in new ideas for new ways to make 1938 the road-building and construction year of the decade—so remember the date and . . . DON'T MISS IT!

AMERICAN ROAD BUILDERS ASSOCIATION

NATIONAL PRESS BUILDING

WASHINGTON, D. C.

One-Way Traffic

(Continued from page 15)

proaching him sees the "Stop" and thus the yellow side is toward Flagman B who knows immediately that he can let his line of cars go ahead. There is no wild waving of flags that causes so many misunderstandings and the possibility of two lines of cars starting ahead at the same time.

When Flagman B has let all his cars go ahead he puts up his sign so that it shows "Stop" to approaching cars and thus shows the yellow back of his sign to Flagman A, who releases his pent-up traffic to pass through the bottleneck. We have suggested the two contrasting colors of white and yellow for the backgrounds of the signs as they are most easily recognized by the flagmen at a distance. We have also recommended the large size of the sign to permit the spot of color being of sufficient size to be readily seen at a considerable distance. The lettering is for the cars close by but the background color is for the distant flagman.

We are not so rabidly opposed to the red flag of communism as to wish to forbid its use for signalling on highway work, but we are adamant in our opposition to the unintelligent and promiscuous waving of flags by relief workers and others who have no idea of the way their gyrations look to the approaching motorist. Their signals are meaningless and dangerous.

A Mechanical Hoist For Motor Truck Bodies

Secure locking of the dump-truck body to the truck base when in level position for hauling is a feature of the Kyle truck-body hoist which has recently been placed on a production basis by Kyle Sales Co., Decatur, Ill.

The powerful lifting action of the Kyle hoist is accomplished by means of segmented jacks which lock into rigid struts or tension members which are released section by section when the body is lowered by the triplex pin spiders. The power of the jacks is the same in either tension or compression and they automatically lock the bed in any position. This means that the unit can be



The Kyle Truck-Body Hoist

used not only to elevate the body and load but also as a hoisting mechanism valuable in loading heavy tractors, for example.

The hoist is driven from a conventional power take-off on the truck transmission through two universal joints to a bronze worm reduction gear. A hand hoist of the same type, which has no worm gear, is available, but is locked with pawls rather than the worm. The manufacturer reports the hoist is light in weight which offers an advantage on light trucks. The lifting pressure is applied close to the front end of the body in all positions so that distorting forces applied to the body are reduced to a minimum. This makes lighter body construction possible and longer life for both the hoist mechanism and the body itself.

Complete information on the Kyle hoist may be secured direct from the manufacturer by mentioning this magazine.

Soils and Binders In Road Stabilization

Bulletin No. 47 in the series on the practical application of scientific and technical highway principles issued by the American Road Builders' Association is devoted to a study of soil stabilization.

It contains a discussion of the role of soil binders and aggregates in soil sta-

bilization by C. A. Hogentogler, Senior Highway Engineer, and James A. Kelley, Junior Highway Engineer, of the U. S. Bureau of Public Roads; an article on road stabilization by L. L. Allen, Assistant Maintenance Engineer of the Minnesota State Highway Department; and a discussion by Fred Burggraf, Research Engineer, Calcium Chloride Association, on stabilization with aggregates, binder-soil and calcium chloride.

Copies of this bulletin may be secured without obligation by interested contractors and engineers direct from the Calcium Chloride Association, Penobscot Bldg., Detroit, Mich.

Craven Co. Takes on A-C Graders for North Carolina

Announcement has been made by the E. F. Craven Co., of Greensboro, N. C., that it has taken on the line of Allis-Chalmers graders and Speed Patrols for North Carolina. A complete line of graders will be carried.

New Asst. Sales Manager Appointed by Waukesha

F. C. Schulze has been appointed to the post of Assistant Sales Manager by the Waukesha Motor Co., of Waukesha, Wis., as a part of its sales department expansion program. Mr. Schulze, who has been with the company since 1928, joined the Sales Department 4 years ago.

WILLIAMS FORM CLAMPS

It costs 8c per cu. yd. of concrete for rod replacement in using Williams Clamps on a form design of 800 lbs. pressure per sq. ft. Compare this with the cost of your present ties—and you will be added to our list of satisfied customers.

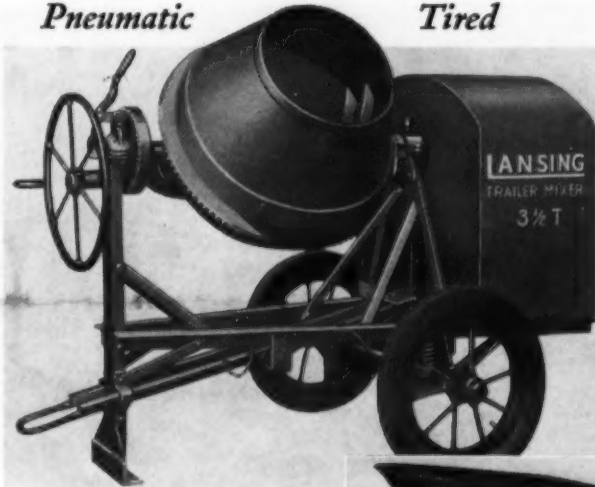
Order today—24 hr. service—send plans for rod layout.

Williams Form Engineering Corp.
1244 Prospect Ave., S. E.
Grand Rapids Michigan

—fast . . economy . . low cost

Pneumatic

Tired



MORTAR MIXERS
CONCRETE CHUTES
WHEELBARROWS
MORTAR BOXES
CONCRETE MIXERS
(4 Sizes)
SCRAPERS

new LANSING 3 1/2-T Mixer

One of Lansing's dependable concrete mixers — the fast, rugged 3 1/2-T. Better on the job—and better profits for the owner.

Timken and Hyatt Roller Bearings; large, quick-mixing drum; Alemite fittings; Lauson 2 h.p. gasoline engine; pneumatic rubber tires—and other dominant features. Ask for special Lansing Mixer catalog—and other information.

Popular LANSING Barrow

The F-4 1/2 Barrow is outstanding with its deep tray; reinforced frame; channel-iron legs; Never-slip type axle; 16" wheel with ball bearings. Capacity 4 1/2 cu. ft. (dry). EASY loading and dumping. Ask for Bulletin L-12, prices, etc.

LANSING

LANSING COMPANY, Lansing, Michigan

CHICAGO NEW YORK PHILADELPHIA BOSTON MINNEAPOLIS KANSAS CITY SAN FRANCISCO

Setting the Pace

Before the year ends write us for details about Buffalo-Springfield Rollers. Their dependable performance and economical upkeep have become the criteria for roller excellence in the road construction and maintenance field.



BUFFALO-SPRINGFIELD ROLLER CO., SPRINGFIELD, OHIO

HOTEL CHELSEA RIGHT ON THE BOARDWALK

FOR RECREATION OR RELAXATION
Choose the Chelsea

Here you will find everything to further your comfort and enjoyment—outside ocean-view rooms . . . wide verandas for lounging . . . sun deck . . . beautiful dining room at the ocean's edge . . . superb cuisine . . . varied sports and entertainment. You'll like your fellow guests, too, and the delightfully friendly atmosphere of the Chelsea.

SPECIAL WEEKLY RATES

ATLANTIC CITY

JOEL HILLMAN • J. CHRISTIAN MYERS • JULIAN A. HILLMAN

FROM WITH MEALS & BATH \$6

ROOM ONLY & BATH \$3

Per Person 2 in a Room



An Installation of Thompson Hiway Guard Between Cascade and Divide in Colorado

New Highway Guard Rail

The new Thompson Hiway Guard, made by the Thompson Mfg. Co., 30th & Larimer Sts., Denver, Colo., consists of a beam-type rail attached to the posts with strong steel springs which stand out about 8 inches from the posts, serving to cushion the shock in case of impact. At the same time, the rigidity of the rail tends to deflect the vehicle back into the road in case of any ordinary accident, according to the manufacturer.

Constructed of high-quality steel, the beams with full-rounded edge overlap in the direction of travel so that the car slides along without obstruction. The convex surface of the rail when painted white provides full visibility as well as providing a neat streamlined appearance.

Complete information on the installation of this guard rail, which is simple and inexpensive, as well as details on the guard and accessories are contained in a new bulletin which may be secured direct from the manufacturer by mentioning this magazine.

Texas Grade Crossings Have Sodium Lights

G-E sodium safety lights have been installed on U. S. Highway 23 at three crossings that highway makes over Santa Fe Railroad tracks in West Brownwood, Texas. The units illuminate the hazards existing at the unavoidable crossings, two of which are over recently constructed quadrants connecting the Santa Fe with the Fort Worth and Rio Grande tracks.

The first installation in Texas of the new safety luminaries was made on a small bridge at Kerrville in 1936. Since then other installations have been made on the Sims Bayou Bridge on LaPorte Road just outside of Houston, and on the new Poplar-Beckham overpass on the Dallas-Tyler highway at Tyler.

New A-C Welders

A new low-cost alternating-current welder for use in maintenance and repair of construction equipment as well as for light construction work has recently been announced by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. This Midget welder comprises a special transformer and control especially designed for alternating-current arc welding.

The current range of the sets are from 30 to 140 amperes with twelve steps of current adjustment. The secondary open voltage is 50 on the low range and 55 on the high. The primary current in-put for welding at 140 amperes is 70 amperes at 110 volts and 35 amperes at 220 volts and is proportionately lower when welding at lower ranges. The set is designed for use with coated electrodes from 1/16 to 5/32-inch in diameter.

The Midget is easily portable, being equipped with handles and four large

hard-rubber swivel casters for readily moving to convenient locations. Complete accessories are included with each set and consist of welding lead with holder and current adjusting plug attached, ground lead with handy C clamp, helmet, wire brush, Crucible Weld electrodes and primary lead.

Features of Autocar 1938 Truck Models

Autocar has announced four engineering achievements for its 1938 line of motor trucks. In the 84-inch standard wheelbase, Autocar claims the shortest short-wheelbase handiness now provided by any truck manufacturer. This company holds exclusive patents on engine-under-the-seat design. Another feature is the 6-man cab developed specially for the public utilities and representing several new departures in design. This cab has an adjustable front seat, two doors in the right and one on the left, one large window on the left, a 30-inch

adjustable rear window, and an adjustable cab-scope on the roof.

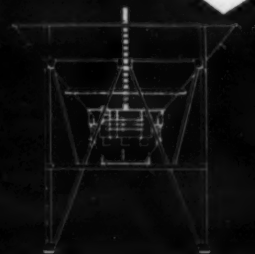
Although Autocar, of Ardmore, Pa., does not manufacture diesels it has built

this form of power into a large number of models at the request of customers. Every week throughout the past year has seen shipments of diesel trucks.

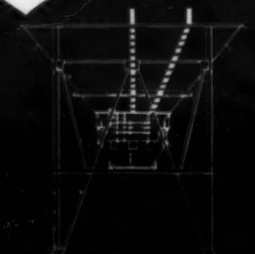


ONLY

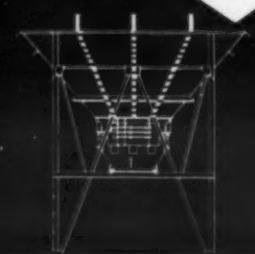
YOU BUY THIS 2 COMPARTMENT BIN



ON YOUR NEXT JOB YOU CAN CONVERT TO A 3 COMPARTMENT BIN LIKE THIS



...OR A 4 COMPARTMENT BIN LIKE THIS...



THE ORIGINAL BIN DESIGN PROVIDES FOR THESE CONVERSIONS TO BE MADE RAPIDLY AND ECONOMICALLY

IN BLAW-KNOX BATCHERPLANTS



you buy

VERSATILITY

Look ahead when you buy a bin and batcher, beyond your present job. Buy a versatile Blaw-Knox BATCHERPLANT—convertible to varying needs and specifications—to use on many jobs.

As your requirements change, add bin bulkheads at slight extra cost to suit your aggregate specifications.

The Weighing Batchers you buy originally is designed to accommodate extra weighing beams to meet these changing conditions, the cost of extra weighing beams is nominal.

Only at Blaw-Knox can you buy this changeability in a standard, shipped from stock, Batchers—with the added features of self-cleaning bin design; ease of erection; accurate, simple and dependable weighing batchers—and rugged construction to last through a number of jobs.

We will gladly send you complete details.

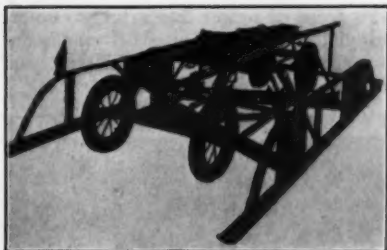
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The New Allen Road Maintenance Machine

Hydraulic Control Unit For Road Maintenance

An hydraulically controlled road maintenance machine, which works at speeds up to 20 miles per hour and is equipped with long side rails to increase its effective length for greater smoothness of road surface, has been developed by the Allen Road Machinery Corp., Shreveport, La. It is built in two sizes, the standard machine 7 feet 6 inches wide and weighing 2,100 pounds, requiring a 1½-ton truck or farm tractor to pull it, and the larger machine 10 feet 6 inches wide, weighing 3,500 pounds and requiring a 4-wheel drive or a 3 to 5-ton rear-wheel-drive truck or industrial-type rubber-tired tractor to pull it.

The machine is automatically controlled hydraulically. Once the machine has been set by the operator, the blade elevation is automatically changed by the draw-bar pull without altering the contour of the road so that the blades carry the correct amount of material properly to maintain the road.

The manufacturer claims that the thorough mixing of the material with the two blades will eliminate washboard and return oversize aggregate to the shoulder. It is recommended by the manufacturer for blading dirt, gravel, crushed stone, shell, sand and caliche and for laying black-top and oil-mat. It may be equipped with a scarifier attachment for preparing and shaping oiled roads for reworking.

Engine Bearings Set Record on Ore. Road Job

What is believed to be a record in engine-bearing performance under extraordinary conditions is reported by a Portland, Oregon, contractor who recently completed a highway job through rugged country at Toledo and Newport, Ore. Working at top speed on a contract which called for a very stiff schedule, the contractor, the Consolidated Highway Co. of Portland, operated on three 7-hour shifts a day, six days a week for 10 months. He used three Cletrac tractors equipped with Hercules diesel engines, and during this period they put in a total of 18,000 hours of tough work. Only 44 hours time out was taken by all three Cletracs for adjustments of any kind and during the entire period not an engine bearing had to be touched.

The bearings which made this record are a special copper-lead alloy developed by the Bohn Aluminum & Brass Corp., Detroit, Mich. They are compounded for heavy-duty work and, although they have been available only for the past three years, have already been widely used where extra heavy-duty service is required.

On this job, the contractor reports that the tractors maintained a schedule of 12 trips per hour over a 1,100-foot average haul. On the Newport job there were 89,200 cubic yards of common excavation, 4,000 cubic yards station overhaul and 74,000 yard-miles overhaul. On the Toledo job, there were 161,000 cubic yards of blue shale excavation, 232,000 cubic yards of overhaul, 28,000 yard-miles of overhaul trapped and about 70,000 yards of slide material. Due to the minimum amount of time required for adjustments on the equipment, the contractor was able to finish the work 45 days ahead of time.

New Stemming Plugs Improve Blasting

A plug which aids in sealing the shot-hole in hard rock operations, providing a hard, solid and gas-tight stemming, has been developed by the Safety Stemming Plug Sales Co., Koppers Bldg., Pittsburgh, Pa. The plug, known as the Safety Stemming V-Plug, consists of a cylinder of hard non-flammable material with a cavity at one end and a central longitudinal hole through which is passed a non-flammable cord knotted

at one end. The knot is larger than the central hole and lies within the cavity. The diameter of the plug is slightly less than that of the borehole and a notch along the outside of the plug provides space for the fuse or detonator wires in electric shot firing.

The plug is placed in the bore-hole, held firmly in the required position by the cord, and damp clay, or sand and clay, is tamped firmly against it. The plug is then pulled back slightly to embed it firmly in the clay and tamping is completed with more clay always rammed tightly. In this manner the primer cartridge and detonator are protected and there is no possibility of the detonator being stuck by the stemming rod.

It is claimed that the use of this plug increases the efficiency of the explosion so that individual charges may be reduced from 20 to 30 per cent and that in some tunnel operations the number of holes can be considerably reduced. It furnishes better fragmentation and reduces the smoke through preventing blown-out shots.

New Flame-Proof Material Will Protect Wood Forms

A new flame proofing material which has been perfected by the United States Flame Proofing Corp., 4461 W. Jefferson Ave., Detroit, Mich., was recently demonstrated in Detroit. Two small furnished test houses were stored with excelsior and kerosene-soaked materials and set on fire. One house had been

fire-proofed with the new material; the other was untreated. Three and a half minutes after the houses had been set on fire, the flames in the treated house had burned out while the untreated house was fully ablaze and well on its way to total destruction.

This material, which is a liquid product easily applied, is adaptable to the construction industry for fire-proofing wooden forms, wood scaffolding, and the wood buildings housing personnel and equipment on construction jobs.



1. "STRADDLE-MOUNT" Heil Telescopic dump unit.
2. TWIN CYLINDER HEIL hydraulic dump unit.

● Powerful Heil hydraulic dump units have inbuilt endurance, stamina and ruggedness to stand up under the terrific punishment of grueling dumping service—That's why they are champions in their field and that's why dump truck users everywhere insist on Heil Quality-built dump units—The complete Heil line includes equipment of every type for all kinds of service—Consult your nearest Heil representative or address your inquiry to:

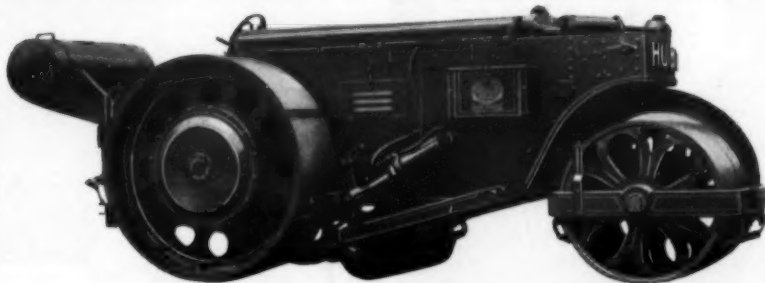
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For Long Service . . . HUBER "TRU-PLANE" MOTOR ROLLERS

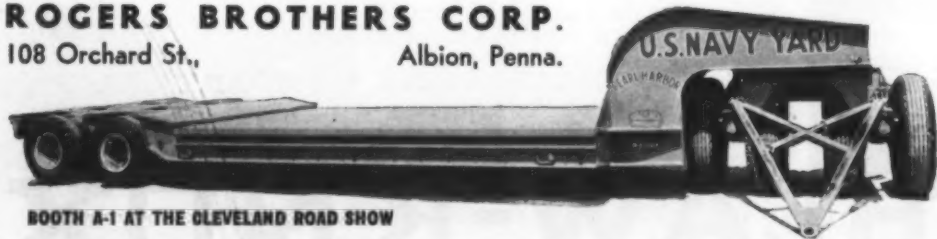


Huber Automotive Type Road Rollers are available in a complete range of sizes with all the latest attachments and accessories including the Huber "Tru-Plane" high compression and smoothing roll. Send for FREE BULLETINS.

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ROGERS BROTHERS CORP.
108 Orchard St., Albion, Penna.



BOOTH A-1 AT THE CLEVELAND ROAD SHOW

With today's jobs demanding the utmost efficiency from every department of your organization, investigate the possibilities in ROGERS units for faster hauling with a greater margin of safety and savings.

Model D-50-D

50 Ton Drop Deck Trailer—Deck is 10' wide, 16' from the back of the goose-neck to the front of the rear bridge, 28" high.

Change of Address Slip

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Monthly
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FROM

TO

A New Diesel-Powered Portable Compressor

A new self-contained diesel-powered 210-cfm air compressor, available with several types of portable and semi-portable mountings for a wide variety of service applications, has just been announced by Fairbanks, Morse & Co., 900 So. Wabash Ave., Chicago, Ill.

Features claimed for this new unit are the economy and dependability of the F-M Model 36-A diesel engine, light weight, ample bearing surfaces and proper lubrication for long trouble-free life, a water cooling system designed to provide uniform cooling in any climate and under any condition, and low upkeep expense. The compressor is designed to operate at full engine speed, permitting direct connection to the engine without reducing gears or belts and without sacrificing engine horsepower through reducing the rated speed. The engine is a Model 36-A 4-cycle 6-cylinder medium-high speed unit, simple in design and sturdy in construction.

This new unit is available mounted on wooden skids, steel wheels, solid or pneumatic-rubber-tired wheels, two or four-wheel trailer, and motor or railway truck.

Complete specifications are contained in Bulletin 3645-A1 which is available upon request to the manufacturer.

A New 2½-Yard Dragline For Long-Range Digging

The new P & H 2½-yard dragline, known as the Model 955-LC, recently announced by the Harnischfeger Corp., 4419 W. National Ave., Milwaukee, Wis., is a modern machine designed to give bigger production on all classes of dragline work. Of all-welded design, it is lighter, faster and easier to move and with its 80 to 100-foot aluminum boom has a wider working range which increases its service.

The Model 955-LC is equipped with exceptionally long crawlers, accommodating shoes 30, 36 and 42 inches in width. The crawlers are of the non-clogging type, have a true rolling action in travel, and are easy to adjust. Driving wear is taken on hardened steel link pins, with each pin capable of taking the entire driving load. Another feature is a new type fair-lead which is designed to keep the bucket moving faster. The large-diameter sheaves are light in weight and roll free and easily. Chilled curved check plates and easy swiveling action keep the cable properly spooled on the drum and pulling in a direct line.

Power is furnished by a 185-hp 8-cylinder diesel engine. Other features include helical-gear-drive throughout; roller-bearing-mounted drums, clutches and shafts; big live roller circle that supports the revolving upper which is tied to the lower car body by the use of hook rollers to insure proper balance of the entire machine on the long boom operations.

New Electric Welder For Pipe Line Work

A new electric welding machine, designed exclusively for pipe line work, has been announced by the Wilson Welder & Metals Co., Inc., 60 East 42nd St., New York City. This machine, in 300 and 400-ampere capacities, has been made particularly rugged because of the character of the work it is expected to undertake. The conditions surrounding pipe line welding require a strongly built weatherproof machine with no weak parts.

The Yellow Jacket, as the new machine is known because of its distinguishing color, has double sediment

collectors for the carburetor supply, an improved fool-proof idling device, a 36-gallon capacity gasoline tank and an improved current switch. It is of close-coupled design with the center of gravity lowered one foot and has a light-weight reinforced base and framework with a center lifting bail and a double-radiator protecting grill. The distributor and other parts are easily accessible and for operating purposes two-hinged panels are placed on each side, thereby permitting instant access to all controls. The machine is built with either battery or magneto ignition.

Curing Concrete by The Admixture Method

The revisions in the specifications for the integral curing of concrete recently proposed by Committee C9 on Concrete and Concrete Aggregates of the American Society for Testing Materials, if adopted as standard, will permit the use of the dry flake as well as the

solution form of calcium chloride.

When calcium chloride was first used for integral curing, the material was manufactured in the granular form only, and in such form it was necessary that it be dissolved thoroughly before it was added to the mix. For many years, however, all manufacturers have produced flake calcium chloride conforming to the requirements of A. S. T. M. specification D98-34. As a result of the rapid dissolution of the product conforming to this specification, calcium chloride may be added directly to the mix in the dry form.

The improvement in the handling of calcium chloride in dry form makes this method of curing practical for small as well as large projects. The material may be proportioned and cared for in the same manner as the cement. It can be packaged in the proper amount for each batch or weighed into the mixer with the other materials.

The proposed revision will promote more efficient use of calcium chloride

in that it recognizes the fact that the prevailing temperature affects the amount of calcium chloride necessary to attain the maximum benefit. The specification recommends that calcium chloride be used as follows: for temperatures below 80 degrees F., 2 pounds should be used per sack of cement; 80 to 90 degrees, 1½ pounds; and for temperatures above 90 degrees, 1 pound per sack of cement.

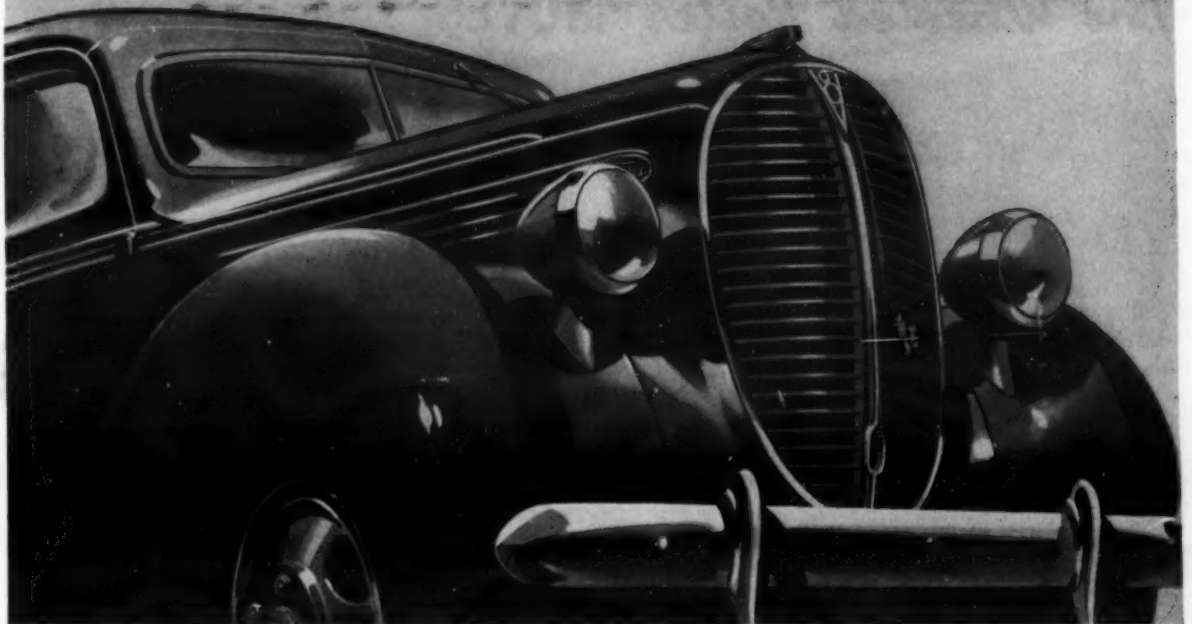
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TARPAULINS
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CONTRACTOR SUPPLY DEALERS in every state sell the FULTON LINE. Ask for SHUREDRY and FULTEX Tents, Tarpsaulins and Windbreaks—anything made of canvas. Also Road Mats and Burlap. You buy quality products at fair prices when you buy the Fulton Line. Write our nearest plant today for catalog, samples and price list.

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ANNOUNCING THE 1938 LINE OF FORD V-8 TRUCKS INCLUDING A NEW One-Tonner



FORD OFFERS WIDE RANGE. FAMOUS V-8 ENGINE BRINGS NEW ECONOMY TO LOADS IN ONE-TON RANGE

THE Ford Motor Company has built more than four million trucks. With this great background of experience, it means something to say that the 1938 Ford V-8 Trucks are the finest Ford has ever built.

Here is the widest range of types and sizes in all Ford history. The big 134-inch and 157-inch wheelbase Ford V-8 Trucks are designed to do the work of heavier, more expensive units—and do it faster, at lower cost. An entirely new line of 122-inch wheelbase one-ton trucks has been added to bridge the gap between the larger trucks and the new 112-inch


wheelbase commercial cars. For practically every hauling and delivery requirement there is now a unit that gives the high Ford standard of dependability and economy!

The 1938 line of trucks and commercial cars are all newly styled. They have an impressive new front end, a sturdy new grille, new headlamps, massive full-skirted fenders. Their smart, modern appearance is a definite asset to any business.

Other important advances for 1938 are a new 134-inch wheelbase in the big truck line . . . a new frame width for both the 134-inch and 157-inch

wheelbase units . . . 7.50—20 dual tire and wheel equipment available at extra cost . . . improved brakes and easier steering . . . stronger construction in vital parts.

The new one-tonners and the commercial cars offer a choice of the 85 or 60 horsepower V-8 engine.

Your Ford dealer invites you to see the new line—and to make an "on-the-job" test with your loads and your driver. 

LOW FIRST COST IS ONLY THE START OF FORD ECONOMY

FORD'S SEVENTH YEAR
OF V-8 SUCCESS



The New Bucyrus-Erie 33-B Shovel

A New Power Shovel

The 33-B, a 1 1/4-yard excavator convertible for shovel, crane, dragline, clamshell, or dragshovel service, has recently been announced by the Bucyrus-Erie Co., South Milwaukee, Wis. Modern alloy steels and welded construction have been used to produce a machine with smooth working operation, high speed, high mobility and ample strength to give steady, dependable service, according to the manufacturer.

Features of this new unit are the unusually long crawler frame to reduce "nosing in" when digging; crawler side frames of unit steel castings; welded box-girder boom of light weight for speed and strength for endurance; a powerful modern hoist and chain crowd; a dipper with manganese steel casting, V-type front, sockets for the Bucyrus-Erie patented inserted teeth and having a curved plate door. All high-speed shafts operate on ball or roller bearings. The snappier swing action and high-speed output claimed for this new shovel are the result of the elimination of dead weight. Big wide-faced clutches take

hold smoothly and firmly and hold adjustments accurately. Lubrication is simple, the vital points being cared for by complete enclosures containing oil. Power rides on anti-friction bearings direct to the point of action. A choice of three different types of power is available, gasoline, diesel or electric.

Complete information on this new machine is contained in the 33-B bulletin, copies of which may be secured direct from the manufacturer on request by mentioning this magazine.

21 Per Cent of Highway Funds Purchase Equipment

Approximately 21.25 per cent of highway construction funds goes for the purchase of equipment, according to a report of T. Warren Allen, of the U. S. Bureau of Public Roads. This report further shows the following break-down of such purchases:

| Equipment | Per Cent |
|------------------------------------------------------------------------------------------------|----------|
| Trucks | 40.2 |
| Cranes, shovels and draglines | 19.6 |
| Tractors | 9.7 |
| Concrete paving equipment | 7.5 |
| Graders and scrapers | 4.6 |
| Bituminous paving equipment | 3.6 |
| Drilling equipment | 3.5 |
| Miscellaneous (including crushing, screening and conveying equipment, pumping equipment, etc.) | 11.3 |

The American Road Builders' Association announces that the highway appropriations, Federal, state and local, are expected to exceed \$1,000,000,000 in 1938, in which case more than \$200,000,000 will be spent for equipment.

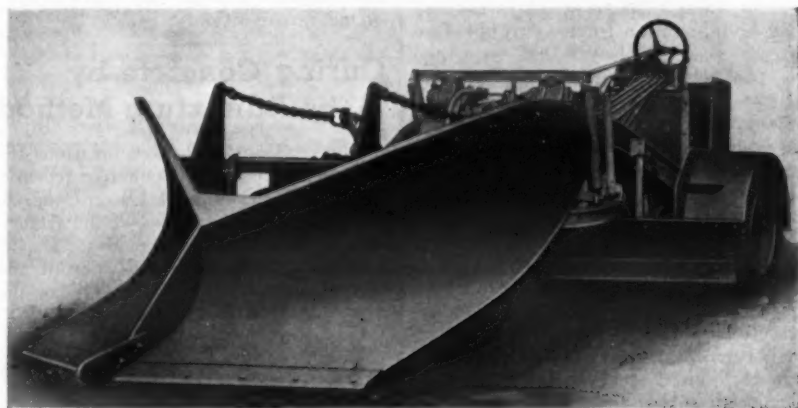
Public Works in Ethiopia

A plan for public works development in Italian East Africa on a broad scale has been approved by the Italian Coun-

cil of Ministers, according to a report from the U. S. Bureau of Foreign and Domestic Commerce. Aside from an annual contribution by the State of 1,000,000,000 lire to the budget of Italian East Africa for ordinary expenses, it is announced that 12,000,000,000 lire will be appropriated over the coming 6-year period in annual allotments of 2,000,000,000 for various categories of public works. Of this amount 7,730,000,000 lire will go to road construction.

Salvador Pushes Road

Construction on the section of the International Highway through El Salvador, Central America, is being continued at a rapid rate, according to a recent report from the U. S. Bureau of Foreign and Domestic Commerce. More than 3,000 men are being employed and the monthly expenditures average over \$40,000.



Traffic Marches On—Safely



Here the Galion sander is shown in operation. Note how it spreads material ahead of rear truck wheels for safe and sure traction.

If the proper precautions have been made . . . snow removed and icy streets and highways sanded to prevent skidding . . . traffic will march on safely and more contentedly. Perhaps a life will be saved.

Galion is ever cognizant of the importance of decreasing these accidents and saving lives . . . has built equipment to help YOU make driving safer.

For removing snow Galion combines the well-known "Junior Patrol" motor grader with an efficient snow plow attachment (above). Thus the grader serves a twofold purpose as it can be used in road building and maintenance work all the year 'round.

For spreading material on those icy streets and highways Galion builds a unique little sander which can be easily attached to truck for spreading and for towing. Will spread sand, cinders, stone dust, chips or calcium chloride efficiently and economically.

May we send you additional information covering these winter necessities?

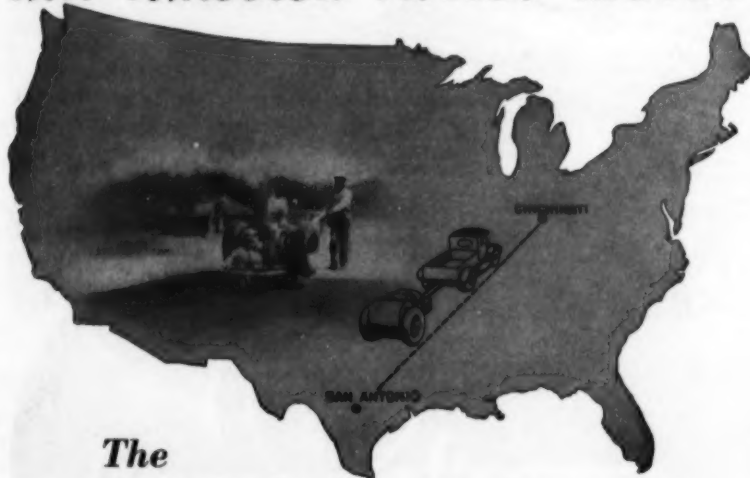


The Galion Iron Works & Mfg. Co.

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The Wheeled Roller MOVES



The WHEELED ROLLER

heretofore a product of the Wheeled Roller Corp., San Antonio, Texas, will, beginning January 1, 1938, be manufactured and sold exclusively by

LITTLEFORD BROS.

485 E. Pearl St.
CINCINNATI, OHIO

Universal approval and ever increasing demand for Wheeled Rollers requires—

1. A central point of manufacture. For better deliveries and lower shipping costs.
2. The use of standard parts in their construction. For adequate service on new and operating rollers.
2. A nation-wide sales and service arrangement. To properly sell and service Wheeled Rollers, everywhere.

Wheeled Rollers fit in perfectly with the Littleford line—the most complete line of Road Maintenance Equipment on the market today.

Look for the Littleford Motorized Wheeled Roller at the Road Show, Cleveland, Jan. 17-21

THE HOTEL OF THE MONTH

Mark Twain
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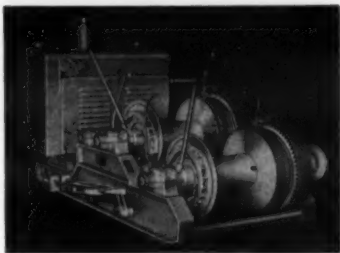
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You'll get more for your money at Pick Hotels. Spacious, comfortable rooms. Delicious food and real personal service. All at moderate prices.

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TERRE HAUTE, INDIANA TERRE HAUTE HOUSE
ASHLAND, KENTUCKY VENTURA HOTEL
OWENSBORO, KENTUCKY OWENSBORO HOTEL
JACKSON, TENNESSEE NEW SOUTHERN HOTEL
ST. LOUIS, MO. MARK TWAIN HOTEL
WACO, TEXAS RALEIGH HOTEL



WHENEVER YOU SEE THE WORD PICK THINK OF ALBERT PICK HOTELS



One of the New CMC Double-Drum Hoists

New Double-Drum Hoist

The CMC general-utility double drum hoist, made by the Construction Machinery Co., Waterloo, Iowa, is of modern simplified construction. The side frames and pedestals are I-beam sections connected by spreaders and having a heavy steel plate extending from the top of the rear pedestal to the end of the side frames. All are welded into an integral unit with the rigidity of a solid cast base but having only a fraction of the weight.

Timken bearings take the end thrust so that it does not reach the side frames. The sizeable cone frictions have woven asbestos lining. The bronze thrust screws have many times the effective thrust area of commonly used pins and a positive drum release protects against accidents. The triple-strand silent roller chain and cut sprocket drive runs in oil. A handy engine throttle is within easy reach of the operator. There are three optional drum sizes and oversize steel drum shafts.

These general-utility hoists, which are available in single as well as double drum units, are made in a variety of capacities to meet the requirements of construction jobs. An improved line of single and double-drum light-duty hoists was also recently announced by this company.

Chain Saw Operated By Gasoline Engine

A new light-weight chain saw which operates direct from a Mall 3 or 5-hp 4-cycle air-cooled gasoline engine by means of heavy-duty flexible shafting is made by the Mall Tool Co., 7740 South Chicago Ave., Chicago, Ill.

These portable chain-saw units can be transported anywhere in a light truck and can be operated in remote locations where generator sets or air compressors are not available. The operator merely starts the small engine and begins cutting operations.

Literature describing and illustrating these Mall chain saws may be secured direct from the manufacturer.

New Small Light Weight Electric Welding Unit

A new 200-ampere gasoline-engine-driven arc welder built particularly for installation on emergency service trucks has been announced by Hobart Bros. Co., Troy, Ohio. This smaller lighter weight Junior Model is designed for use where the work to be done does not call for the larger 6-cylinder-engine powered machine already offered by Hobart.

This machine is a completely equipped, factory built outfit on sturdy steel skids, with complete canopy enclosure by means of hinged side panels that fold up over the top and can be padlocked when closed. Equipment includes electric self-starter, battery ignition with generator, built-in fuel pump, air filter, variable speed governor, sectional radiator and it is provided with the Hobart remote control, polarity switch, built-in exciter, dual control and other features as in other larger outfits.

New Rock Crusher Bulletins Ready

The Universal Crusher Co., Cedar Rapids, Iowa, has just issued several new bulletins on its line of rock crushers. Each bulletin gives complete construction details, dimensions, specifications and other essential data.

Bulletin No. 100 covers Universal bronze bearing jaw crushers; Bulletin No. 200 is on Universal roller bearing jaw crushers; Bulletin No. 300 covers Universal roll crushers; and Folder No. 19 covers in compact form the details of Universal 30-Q portable stone crusher plants with a single crusher. Copies of any one or all of these bulletins may be obtained by addressing the Universal Crusher Co., 625 C Avenue, Northwest, Cedar Rapids, Iowa, and mentioning this magazine.

New Unit for Clearing Out Trees and Brush

The new Le Tourneau Treedozzer, recently announced by R. G. Le Tourneau, Inc., Peoria, Ill., and Stockton, Calif., is designed to provide a quick and economical method of clearing out shrubs, small trees and brush. Built for use with a Caterpillar D8 tractor, it has a normal travel speed when operating of about 2 miles an hour.

The Treedozzer consists of two parts, a projecting arm and a V-shaped cutting blade, both controlled by cable through a double-drum power control unit mounted on the tractor, and each part can be operated independently of the other. The chief purpose of the pro-

jecting arm is to push trees over so as to expose the roots and thus enable the cutting blade to complete the job of uprooting and windrowing them.

This Treedozzer is a special tool designed only for clearing mesquite, shallow-rooted trees, cacti, brittle brush and

small trees and in no way replaces the Angledozer or bulldozer which is recommended for larger trees and willow growths or rocks. Treedozzer operations are described in literature which may be secured direct from the manufacturer.

FRANK SNO-FLAWS

Made in Eastern U.S.A. by
CARL H. FRANK Mfg.
CLAYTON, PA. NEW YORK

Made in Western U.S.A. by
DAVENPORT DESLER CORP.
DAVENPORT, IOWA

Made in Canada by
FRANK SNO-FLAWS
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OUTSTANDING!

- in digging ability and durability.

No other bucket approaches

The Owen Bucket

in its ability to take "a mouthful at every bite" and serve for extra long periods with freedom from adjustments or repairs.

Write for catalog explaining the exclusive features that make this outstanding performance possible.

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DRAG LINE ON WHEELS

Serving scattered jobs from scattered sources of supply called for this high-speed MICHIGAN TRUCK DRAGLINE, which has reduced unproductive time between locations, and is loading more trucks per day. Besides cutting operating costs, this MICHIGAN has increased operator efficiency by eliminating fatigue. . . MICHIGAN Accessory Equipment gives owners several machines in one - DRAGLINE, SHOVEL, CRANE, CLAM and TRENCH-HOE - at minimum cost!

MAKE YOUR SMALL JOBS PAY AND YOUR BIG JOBS PAY MORE



25 MI. PER HOUR
FULL CIRCLE LOAD
TRUCK ECONOMY
AIR CONTROLS
CONVERTIBILITY

MICHIGAN

Write for Bulletin 127

POWER SHOVEL CO. Benton Harbor, Mich.

Bulletins and Pamphlets

For free distribution to contractors, engineers and officials. Write for the catalogs you need.

Heavy-Duty Reversible Trailers

460 La Crosse heavy-duty reversible trailers for transporting heavy machinery and materials, as well as the other types of La Crosse heavy-duty trailers and semi-trailers, are described in literature which may be secured direct from the La Crosse Trailer & Equipment Co., La Crosse, Wis.

Bulletins on Hoists and Dump Bodies

461 Two new 6-page bulletins, No. 2 describing and illustrating Gar Wood heavy-duty cam and roller hoists and No. 3 on Gar Wood heavy-duty dump bodies, have recently been issued by Gar Wood Industries, Inc., Hoist & Body Division, Detroit, Mich., which will be glad to send copies on request.

Tractors for Snow Removal

462 Complete information on the use of International wheel tractors and crawler TracTractors for mounting all types of snow-moving equipment may be secured by interested state, county and township highway engineers from the International Harvester Co., Inc., Harvester Bldg., Chicago, Ill.

Engineers' Drawing Materials

463 Weber drawing materials and drafting room supplies, including all types of precision instruments as well as drafting room furniture, are described in Catalog 800 which interested contractors and engineers may secure direct from F. Weber Co., 1220 Buttonwood St., Philadelphia, Pa.

Allies in the Battle Against Snow

464 A new bulletin, describing Adams motor graders with V-type snow plows and wings to aid state, county and township highway engineers in their battle against snow during the coming months and which are readily converted into road construction and maintenance units for the rest of the year, may be secured by those interested direct from the J. D. Adams Co., Indianapolis, Ind.

New Vibrating Screens Bulletin

465 Bulletin SS-1, describing and illustrating Cedar Rapids Symons vibrating screens for aggregate-producing plants, may be secured by those interested direct from the Iowa Mfg. Co., Cedar Rapids, Iowa.

Simplified Arc Welders

466 The new Hobart 40-volt simplified arc welder, a feature of which is the new motor horsepower control, is described in a 24-page bulletin which Hobart Bros., Box CE-107, Troy, Ohio, will be glad to send on request.

A New Wagon Drill

467 The new Ingersoll-Rand FM-2 wagon drill, a feature of which is a ratchet enabling one man to raise or lower the drill guide easily and quickly, is described and illustrated in Bulletin 2253-A which may be secured direct from Ingersoll-Rand Co., 11 Broadway, New York City.

A Pneumatic Rock Breaker

468 The Atlantic pneumatic rock breaker, a simple steel tool which splits large rocks and boulders quickly and easily to facilitate their handling, is described in literature which the Atlantic Steel Co., 1775 Broadway, New York City, will be glad to send on request.

New High-Speed Dredger

469 The Ruth Dredger Mfg. Corp., 5980 So. Boyle Ave., Los Angeles, Calif., has recently issued a new pamphlet describing in detail the features of the Ruth dredger which it will gladly send to those interested, together with complete information on how this dredger will handle your cleaning and construction problems.

Tractors for Year-Round Work

470 The Sargent-Cletrac conversion group, consisting of a Cletrac tractor, a Sargent hydraulic V-type snow plow and a Sargent hydraulic bulldozer, both of which are easily interchangeable, with a power unit including the hook-up common to both, is a year-round road unit for constructing roads or for snow plowing. Literature describing these units may be secured by interested contractors, state, county and township highway engineers direct from the Cleveland Tractor Co., Cleveland, Ohio.

Precision-Built Hoists

471 Cofing precision-built ratchet, spur gear gravity and electric hoists which are designed to handle loads safely and efficiently are described in Catalog No. 33 which may be secured by those interested direct from the Cofing Hoist Co., 313-319 Van Buren St., Danville, Ill.

New Bulletin on Pumps

472 Vickers vane-type pumps for road building and maintenance equipment, hydraulic hoists, tractor and construction applications which, according to the manufacturer, are designed for long life under continuous service at the higher pressures, are described and illustrated in Bulletin 36-12 which may be secured by those interested direct from Vickers, Inc., 1400 Oakman Blvd., Detroit, Mich.

Tar Products for Roads and Bridges

473 Complete information on the advantages of the use of Koppers waterproofing on bridge decks and of Tarmac mixed-in-place construction for low-cost roads is contained in literature which Koppers Co., Tar & Chemical Division, Pittsburgh, Pa., will be glad to send to all interested contractors and engineers on request.

Complete Asphalt Plants

474 Cummmer asphalt plants with a 2-fire dryer-cooler, for either hot or cold-mix in portable types with 1, 1½ or 2-ton mixers, are described in the literature of F. D. Cummmer & Son Co., 17th and Euclid, Cleveland, Ohio.

Concrete Vibrators and Grinders

475 The types, sizes and prices of White concrete vibrators and grinders will be found in circulars which the White Mfg. Co., Elkhart, Ind., will be glad to send on request.

A Wide-Screed Finishing Machine

476 The Flexible Road Joint Machine Co., Warren, Ohio, will be glad to send to those interested complete information on its Flex-Plane finishing machine which has a wide screed and can be used for back screeding.

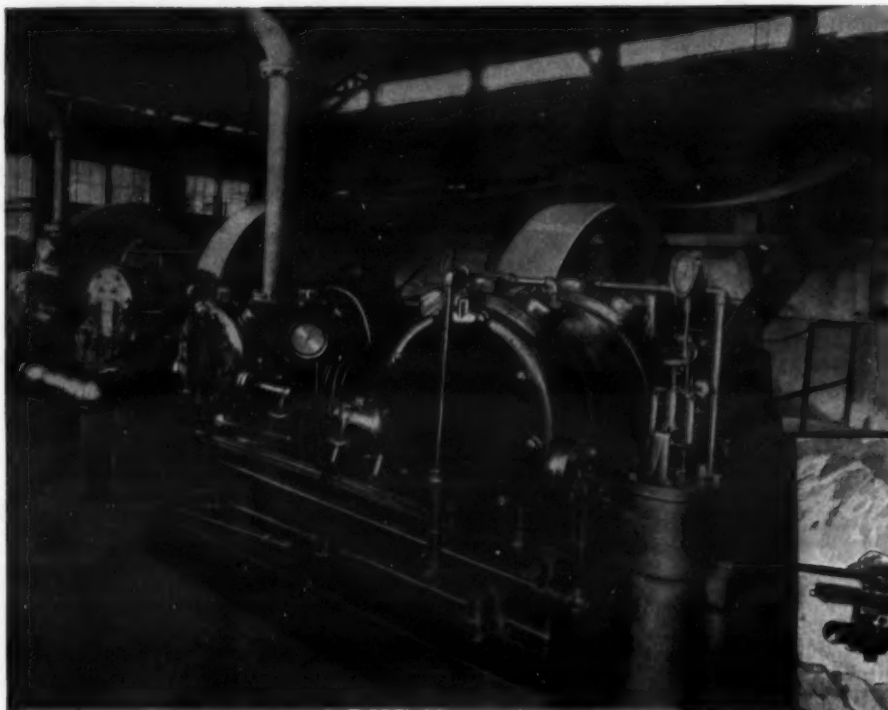
High-Capacity Pumps

477 Information on Marlow self-cleaning high-suction-lift self-priming pumps, with open-type trash impeller and 4-cylinder engine may be secured from Marlow Pumps, Ridgewood, N. J.

(Continued on following page)

IN THE FAMOUS

Mother Lode...



View of compressors at the Argonaut Mine. Texaco Alcaid keeps rings free, valves properly seating, the whole compressor clean.



AIR TOOLS—You can be sure of a big day's work . . . every day . . . for each drill, when it's on Texaco. And this is all anyone can expect of his drills. Above all, don't attempt to save money on air tool lubricants . . . you'll end by having to spend several times more on repairs than your "savings."

"The Argonaut Mine at Jackson, Amador County, is situated in the heart of the famous Mother Lode of California. This gold mine is mining ore from the 6,000 foot level where some of the working faces are approximately 1½ miles from the compressors. The compressors supplying the compressed air are lubricated with Texaco Alcaid Compressor Oil."

The above is from a letter written by Alex F. Ross, Superintendent. From experience, Mr. Ross knows that Texaco Compressor Oils can be counted

upon to give him long, continuous service. He knows that they keep his compressors *clean*, free from gumming and consequent ring sticking with which he formerly was faced.

Trained lubrication engineers are available for consultation on the selection and application of Texaco Compressor and Air Tool Lubricants. Prompt deliveries assured through 2070 warehouse plants throughout the United States. The Texas Company, 135 East 42nd Street, New York City.



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Name _____

Firm _____

Street _____

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P.S. Also send me catalogs and prices on _____

Bulletins and Pamphlets

(Continued from preceding page)

Bituminous Distributors

478 South Bend bituminous distributors, embodying 29 years' experience which has produced an economical, efficient, sturdy machine with non-drip spray bars and quick shut-off, are described in literature which may be secured from Municipal Supply Co., South Bend, Ind.

Ball-Bearing Hoists Up to 100-hp

479 Finger-tip hoist control, double-row self-aligning bearings, and machined balanced drums with silent chain drive and compounding brakes are described in Catalog H-37 which may be secured from the Jaeger Machine Co., 701 Dublin Ave., Columbus, Ohio.

Power-Controlled Elevating Graders

480 The Caterpillar Tractor Co., Peoria, Ill., has issued recently an attractive booklet, Form 4193, describing and illustrating Caterpillar elevating graders and the work that they will do and giving the operating and construction features of both the No. 48 and No. 42 power-controlled graders, copies of which may be secured on request.

Dump Trucks for Construction Jobs

481 White dump trucks, of which there is a model and size for every type of construction requirement, are described and illustrated in a new folder which the White Motor Co., Cleveland, Ohio, will be glad to send to those interested.

Tools of Industry

482 This is the title of a new 184-page catalog recently issued by J. H. Williams & Co., 75 Spring St., New York City, describing its entire industrial line of drop-forged wrenches, including many additions to its carbon and alloy wrenches, which may be secured by those interested on request.

Portable Crushing and Screening Plant

483 The Austin-Western No. 100 portable crushing and screening plant which is claimed to have greater capacity without reducing plant portability and is adaptable to both pit and quarry work, is described in detail in a new illustrated bulletin recently announced by the Austin-Western Road Machinery Co., Aurora, Illinois, which may be secured direct from the manufacturer.

Auxiliary Transmissions

484 The H. S. Watson Co., 1145 Harrison St., San Francisco, Calif., has issued a new bulletin, explaining the advantages arising from the use of auxiliary transmissions to enable your truck to carry heavier loads and meet extreme conditions, which it will be glad to send to those interested.

Hoist and Skidder Bulletin

485 The features of design and operation of Dorsey Brothers Model S skidder and Model M double-drum hoist and pile driver, both of which are adaptable to all truck chassis, are described in a new bulletin which Dorsey Brothers, Elba, Ala., will be glad to send to those interested.

Low-Head Vibrating Screens

486 Allis-Chalmers Mfg. Co., Milwaukee, Wis., has recently issued an attractive new 8-page bulletin, No. 1478A, on its line of low-head vibrating horizontal screens, which are claimed by the manufacturer to be simple in design, sturdy mechanically and economical in operation. Copies may be secured direct from the manufacturer by those interested.

Jacks for Every Lifting Purpose

487 Joyce jacks for every lifting purpose, some of the features of which are their simplified mechanism, enclosed and protected working parts, reversing lever conveniently placed at the top of the jack, and every jack tested and guaranteed to lift the rated tonnage, are described and illustrated in a booklet entitled "The Jack That Joyce Built," copies of which the Joyce-Cridland Co., Dayton, Ohio, will be glad to send on request.

Roller-Gate Concrete Buckets

488 A 16-page completely illustrated booklet describing Blaw-Knox roller-gate concrete buckets, which are available in a number of styles, including cableway-operating and underwater types as well as in special designs for unusual requirements, may be secured direct from the Blaw-Knox Co., 2067 Farmers Bank Bldg., Pittsburgh, Pa. Ask for Catalog 1586.

New Trailer Air Compressor

489 Gordon Smith & Co., Inc., Bowling Green, Ky., has just issued a new 4-page illustrated folder on the Smith Model R-100 Motor-Compressor, which is a complete trailing unit with automatic unloading and idling features. This unit is particularly adapted for drilling, pavement breaking, sand blasting and for the operation of painting and riveting equipment.

New Bulletin on Power Units

490 Bulletin 5C, describing Franklin Air-cooled power units which are designed particularly for heavy-duty service such as is required in the construction industry and which are available in various models of from 50 to 112 hp, may be secured by those interested direct from the Air Cooled Motors Corp., 515 Madison Ave., New York City.

Machine-Mixed Stabilized Roads

491 Low-cost road construction through base and surface stabilization with the new Pioneer stabilizer plant, giving a more uniform mixture of clay, aggregate and stabilizing substance, is described completely in Form No. 522 which may be secured gratis from the Pioneer Gravel Equipment Mfg. Co., 1515 Central Ave., Minneapolis, Minn.

Hydraulic Pressure Control for Shovels

492 Link-Belt Co., 300 W. Pershing Road, Chicago, Ill., will be pleased to send a copy of Book No. 1795 to users of power shovels interested in finger-tip control by the operator. This method removes fatigue from power shovel operation.

Diesel and Gas-Powered Motor Graders

493 The big heavy-duty Model H center-control Warco power grader which is capable of handling tough jobs in any kind of construction and has the Octopus 8-wheel drive is described in the latest bulletins of the W. A. Riddell Corp., Bucyrus, Ohio.

Maximum Traction for Snow Plowing

494 Walter Snow Fighters keep going as long as one wheel has traction and can not be stalled until all four wheels lose traction at once. The value of this feature in snow plowing operations is told in literature of the Walter Motor Truck Co., 1001-19 Irving Ave., Ridgewood, Queens, L.I., N. Y.

Shovels, Draglines and Cranes

495 The Browning Crane & Shovel Co., 16226 Waterloo Road, Cleveland, Ohio, will be pleased to furnish complete information on its diesel, gasoline, steam and electric powered cranes, shovels and draglines.

Air-Operated Concrete Vibrators

496 Engineering data on air-operated vibrators for all classes of concrete construction including bridge deck slabs, dams and locks, as well as portable vibrating screed boards for highway pavements, will be found in the circulars of Munsell Concrete Vibrators, 997 West Side Ave., Jersey City, N. J.

Safety Wrenches for Steel Work

497 Blackhawk "Lock-On" sockets, both heavy and extra-heavy duty, in a wide range of sizes for bridge and building construction crews are described in the literature of Blackhawk Mfg. Co., Dept. CM-11, Milwaukee, Wis.

Vibrators for Concrete Placement

498 C-P vibrators in various sizes and capacities to suit the type of concrete to be placed are described in Folder SP-1955 which the Chicago Pneumatic Tool Co., 6 E. 44th St., New York City, will be glad to send on request.

Free Catalog on Safety Apparel

499 The new 1937-38 catalog of safety apparel recently issued by Industrial Gloves Corp., Danville, Ill., illustrates and describes representative Steel-Grip safeguard in steel re-inforced gloves, mittens and hand guards, asbestos gloves and mittens, welders' protective apparel and industrial safety clothing, including leggings, spats, aprons, sleeves, coats, pants and suits. Copies of this new catalog will be mailed to contractors interested in this protective apparel.

Distributors With Non-Drip Spray Bars

500 Instantaneous shut-off for distributor spray bars developed by Etnyre engineers, puts an end to the dribbling of bituminous material on highways and gives a clean-cut starting and finishing line. The new Etnyre Catalog No. 506-D gives complete information and may be secured from E. D. Etnyre & Co., Inc., Oregon, Ill.

Hard-Hitting Snow Plows

501 Frink Sno-Plows that are built for the hardest kind of snow fighting service with front plows and wings are described in detail in the Frink catalog available from Carl H. Frink, Mfr., Clayton, 1000 Island, N.Y.

Philippines' Largest Bridge To Be Constructed in Manila

The National Loan and Investment Board of the Philippine Islands has approved the release of three loans for the construction of the substructure, superstructure and approaches of the projected Mendiola Street Bridge over the Pasig River in Manila. This structure, which will be the Philippines' largest bridge, will be the fourth spanning of the river in Manila. The first loan for the substructure has already been released and the others will be released later as necessary. It is expected that about two years will be required to complete the construction of this project.

The bridge, which will be not only the longest single span and greatest width of any bridge in the Philippines but also the first bridge with a single span across the Pasig River, will consist of a 396-foot steel arch span having three parallel trusses parabolic in outline, with a rise of 54 feet. There will be two 30-foot roadways for three lines of vehicle traffic each way and a 6-foot

sidewalk on either side of the bridge. The total length of the bridge will be 1,325.33 feet and the structure will require 3,500 timber footing piles, 18,960 cubic yards of concrete, 402 tons of reinforcing steel and 1,700 tons of structural steel.

It is planned to repay the loans from the National Loan and Investment Board by making the bridge a toll affair. It is estimated that by charging 10 centavos for automobiles and 20 centavos for trucks, the cost of the bridge can be repaid within the required time.

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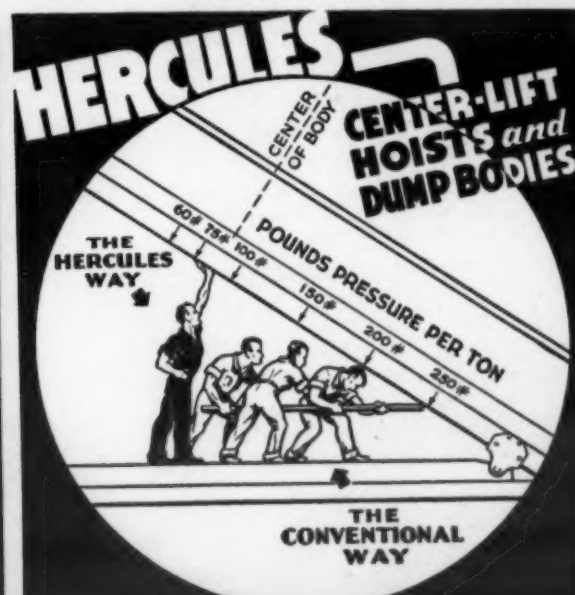
CMC 5s-7s-10s—Two Wheelers. The fastest moving—fastest working one and two bag Mixers ever developed.

CMC 7s and 10s End Discharge Models. New—compact—fast. The advantages of a speedy trailer with four wheel stability.

Modern CMC equipment is winning the battle of profits for thousands of contractors all over the country. They get jobs done—without costly delays—they pay their way by saving time in mixing and moving.

Get CMC's latest catalog and bulletins on new CMC Mixers—all sizes. Wonder Tilters, Dump-over Pneumatic Carts (See illustrations), Hoists, Pumps, Saw Rigs, Wheelbarrows.

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All-steel bodies to meet every requirement - new designs - new improvements in construction.

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C. & E. M. Photos
The Pile-Casting Yard of W. Horace Williams Co., on Its Grade Separation Project at Slidell, La. Right, the 85-Foot Steam Pile Driver Was Rather Big for the Job But Was Needed to Drive the Test Piles. Inset, Whit Downs, Superintendent for the Contractor. See Page 1.



The Rotary's First Job for the State of Arizona Was the Dramatic Rescue of a Party Snowbound on the North Rim of Grand Canyon. See Page 1.



C. & E. M. Photos
Supplying the Needed Moisture for Maximum Density, and Compacting Soil on the Dam for the Emergency Reservoir at Little Rock, Ark. See Page 20.



A P & H Bantam Weight Protecting the Stables At the Ross Race Track at Newport, Del., from Flooding From a Nearby Hillside



This A-C Model K Tractor Equipped With a Baker V-Type Plow Owned by Schuyler County, N.Y., Bucked Heavy Drifts Last Winter



C. & E. M. Photos
The Great Clamshell Dredge Cairo of the United Dredging Co., Working on a Section of Levee in the Atchafalaya Floodway. See Page 17.



A General View of the Large Excavating Operations for the New \$30,000,000 Strip and Tin Plate Mill of the Tennessee Coal, Iron & Railroad Co., at Birmingham, Ala., Showing a Portion of the Fleet of 46 Trucks and 6 Shovels and Draglines Used to Move Over 1,000,000 Yards of Dirt and Rock. See Page 6.